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AS PER LATEST CBSE CURRICULUM 2024-25

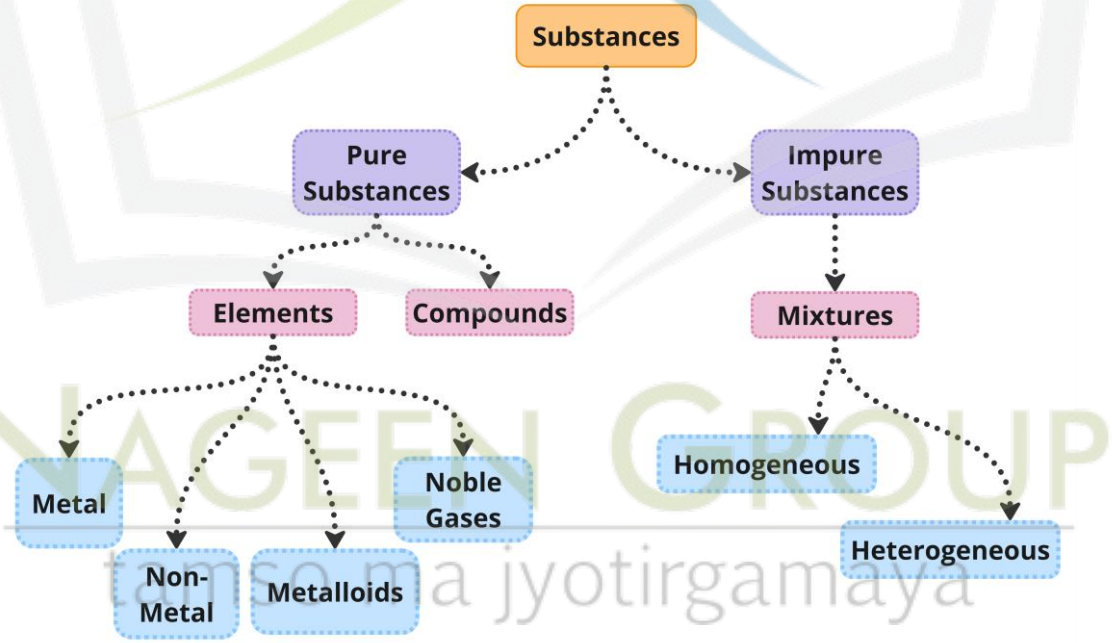
INTRODUCTION

Any substance which has mass and occupies space is matter. All substances surrounding us for instance, the milk and water we drink, the chair we sit in, the air we breathe, the clothes we wear, the bed we sleep are examples of matter.

Substance is a matter which is associated with a set of definite properties and composition. Every pure compound and element is a substance. Substances are the materials composed of atoms and molecules. Every substance is recognized by a specific weight and volume. It cannot be segregated into other different types of matter by performing any physical process.

Examples:

- Silver
- Salt
- Metals, non-metals



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Pure Substances

- Pure substances are elements or compounds.
- They are made up of only one kind of entity.
- They cannot be broken down into simpler entities by chemical or physical methods.
- They have a fixed composition.
- **Example:** Diamond, carbon dioxide.

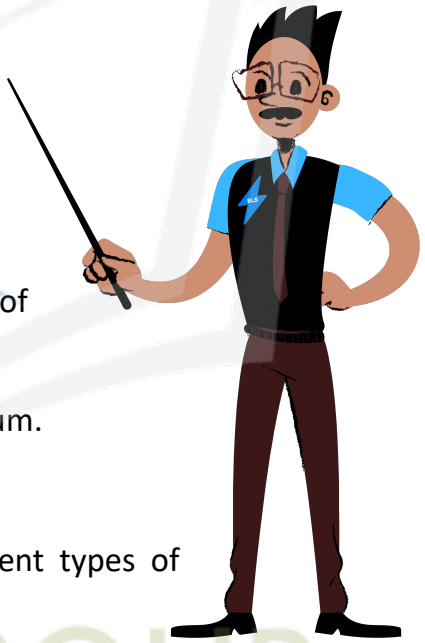
- ❖ Pure substances typically only include one type of atom or molecule and are homogeneous in nature.
- ❖ Most of the time, the composition of these chemicals is constant or uniform.
- ❖ The boiling and melting points of the substances are constant.
- ❖ In a chemical reaction, a pure substance often takes part to produce predictable results.

Elements

- Elements are species of atoms which have the same number of protons in their atomic nuclei.
- Elements are represented by symbols e.g., Hydrogen (H), Boron (B), Carbon (C), Silicon (Si) etc.

Metals: Metal is a solid material which is typically hard, shiny, malleable, fusible, and ductile, with good electrical and thermal conductivity.

Examples: Aluminium, Copper, Iron, Tin, Gold



Nonmetals: Non-metals are brittle and are not malleable or ductile. they are poor conductors of heat and electricity.

Examples: Carbon, Boron etc.

Metalloids: Metalloids exhibit some properties of metals as well as of non-metals.

Examples: Boron, silicon, germanium, arsenic, antimony, and tellurium.

Compounds

Compounds are the substances consisting of two or more different types of elements in a fixed ratio of its atoms.

Example of compounds includes water (H_2O), Hydrogen Peroxide (H_2O_2), etc. You can see water's chemical formula, it says it has 2 atoms of Hydrogen combined with 1 atom of oxygen and in hydrogen peroxide, it has 2 atoms of hydrogen and two atoms of oxygen.

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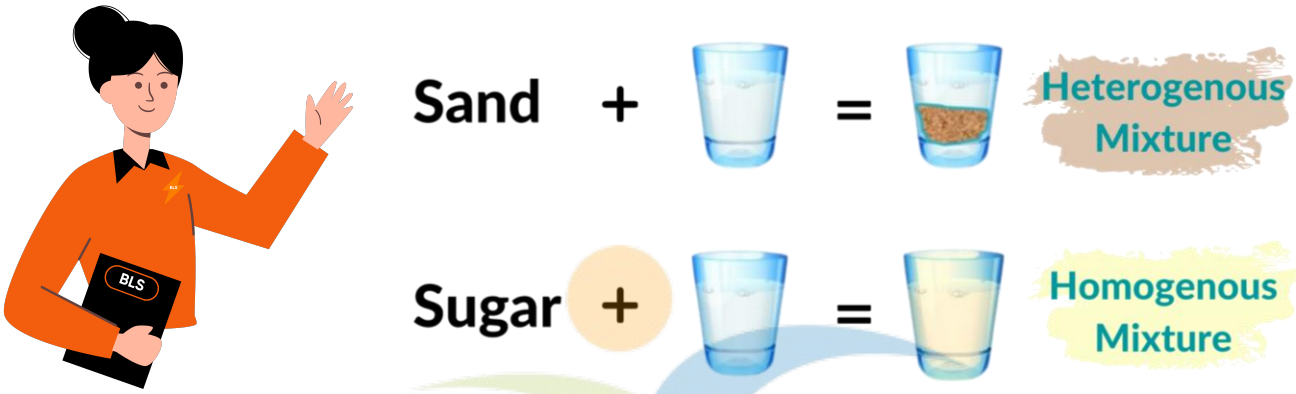
Mixtures

A mixture in chemistry is a substance made up of two or more unrelated chemical components. A mixture is a physical combination of two or more distinct substances that can take the form of solutions, suspensions, or colloids.

Crude oil: A mixture of organic compounds (mainly hydrocarbons)

Seawater: A mixture of various salt and water.

Mixtures are formed by just mixing two or more pure substances (components) such that each substance retains its own chemical identity.



Homogenous Mixtures

When we add sugar, water and lemon juice together they all uniformly mix with each other. Now it is not possible to separate these substances from the mixture. Such mixtures in which the components mix with each other uniformly are called Homogeneous Mixtures.

The ratio of compositions of homogeneous mixtures can be different. **For Example**, one may add two spoons of sugar in lemonade while someone else may add only one spoon of sugar in their lemonade. Still, lemonade is a homogeneous mixture.

Heterogeneous Mixtures

The components in a heterogeneous mixture do not completely dissolve in each other and we can separate them by physical means. In other words, the composition of such mixtures is not uniform.

For Example, If we mix sand in water the sand settles down in water after some time and we can separate it by filtration.

Alloy

An alloy is a mixture of different metals or nonmetals and metals that cannot be separated from each other using physical methods.

For Example:

Brass – Copper with up to 50% zinc

Bronze – Copper with up to 12% tin

Solution

A solution is a type of homogeneous mixture consisting of solute and solvent where the solvent is that component of the solution that dissolves other components whereas the solute is that

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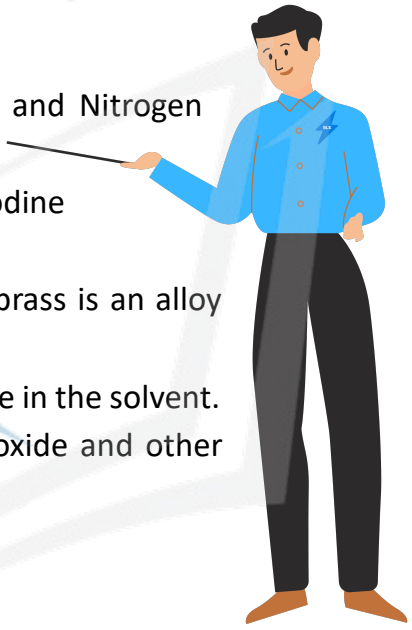
component that gets dissolved in the solvent. For instance, a glass of saltwater has salt as a solute that gets dissolved in water which acts as a solvent in this case.

Solution = Solute + Solvent

Solvent: The substance in which another substance is mixed is called the Solvent. **For Example**, Water is a solvent in which we can mix different substances such as salt or sugar.

Solute: The substance that is added to the solvent to form a solution is called a Solute. **For Example**, Salt, when mixed in water, acts as a solute for the mixture.

Examples of Solution



- Beverages like coffee or tea.
- Air is a solution containing gases primarily, Oxygen (21%) and Nitrogen (78%)
- The tincture of iodine contains alcohol as the solvent and iodine as the solute.
- Alloys are homogeneous mixtures of metals. For instance, brass is an alloy containing 30% zinc and 70% copper.
- Sugar syrup is a solution containing sugar dissolved as a solute in the solvent.
- Carbonated drinks contain solvent as water and carbon dioxide and other ingredients as solutes.

Properties of Solution

- Solution is a homogeneous mixture.
- Solutions are generally very stable, which implies that the solute particles do not separate out on keeping.
- The particles dissolved are extremely small in size, generally less than 1 nm in diameter.
- Since the size of solute particles in the solutions is extremely small, they can easily pass through the filter paper. Therefore, components of a solution cannot be separated by filtration.
- The particles of a solution are negligibly small and cannot be seen even with a microscope.
- Since the size of solute particles in the solutions is extremely small, a true solution does not scatter light.

Concentration of Solutions

The concentration of a solution is the amount of solute present in a given quantity of the solution. In other words, the concentration of a solution is the mass of solute in grams present in 100g of the solution. Based on this definition, there are two main types of solutions.

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The solution that has a small amount of solute is called Dilute Solution. The solution that has a large amount of solute is called Concentrated Solution. This is a very narrow division of solutions. Let us now look at the types of solution in more depth.

Saturated Solution: A saturated solution is one in which you cannot dissolve any more quantity of solute at a given temperature. It means that this kind of solution already contains the maximum amount of solute that you can dissolve in it at a given temperature.

Unsaturated Solution: An unsaturated solution is one in which you can dissolve more quantity of solute at a given temperature.

Method of expressing Concentration

The concentration of a solution can be represented in many ways:

i. Mass by the mass percentage of a solution $= \left(\frac{\text{Mass of solute}}{\text{Mass of solution}}\right) \times 100$

ii. Mass by volume percentage of a solution $= \left(\frac{\text{Mass of solute}}{\text{volume of solution}}\right) \times 100$

For example, If a solution of NaCl in water is said to be 10 % by volume that means a 100 ml solution will contain 10 ml NaCl.

Example 1: 15g of common salt is dissolved in 400g of water. Calculate the concentration of the solution by expressing it in Mass-by-Mass percentage (w/w%).

Solution: Given that,

Mass of solute (common salt) = 15g ...(1)

Mass of Solvent (water) = 400g ...(2)

It is known that,

Mass of Solution = Mass of Solute + Mass of Solvent ...(3)

So, substituting (1) and (2) in (3), we obtain the following,

Mass of Solution = 15g + 400g = 415g ...(4)

$$\text{Mass by Mass Percentage} = \left(\frac{\text{Mass of Solute}}{\text{Mass of Solution}}\right) \times 100 \quad \ldots(5)$$

Substituting (1) and (4) in (5), we obtain the following,

$$\text{Mass by Mass Percentage} = \left(\frac{15\text{g}}{415\text{g}}\right) \times 100 = (0.0361) \times 100 = 3.61$$

(w/w %) = 3.61

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Example 2: 15 g of common salt is dissolved in a solution of 300 mL, calculate the Mass by Volume percentage (w/v%).

Solution: Given that,

Mass of solute (common salt) = 15g ... (1)

Mass of Solution (salt solution) = 300 mL ... (2)

Mass by Volume Percentage

$$= \left(\frac{\text{Mass of Solute}}{\text{Volume of Solution}}\right) \times 100 \ldots (3)$$

Substituting (1) and (2) in (3), we obtain the following,

$$\text{Mass by Volume Percentage} = \left(\frac{15\ \text{g}}{300\ \text{mL}}\right) \times 100 = (0.05) \times 100 = 5\text{g/mL}$$

(w/v %) = 5g/mL

Suspension

A suspension is formed when two or more substances are mixed in a non-uniform manner. Heterogeneous mixtures are suspensions. The solute does not mix with the solvent and can be viewed through naked eyes.

Properties of Suspensions

- A suspension is a heterogeneous mixture.
- We can see the particles of suspensions through naked eyes.
- We can see the path of light through the particles of a suspension.
- The particles of suspension tend to settle down when left undisturbed. Then, they can be separated using filtration.

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Colloidal Solution

A colloidal solution or a colloid is a uniform solution of two or more substances. The particles are relatively very small and the solution appears as a homogeneous mixture but it is not.

Properties of colloids

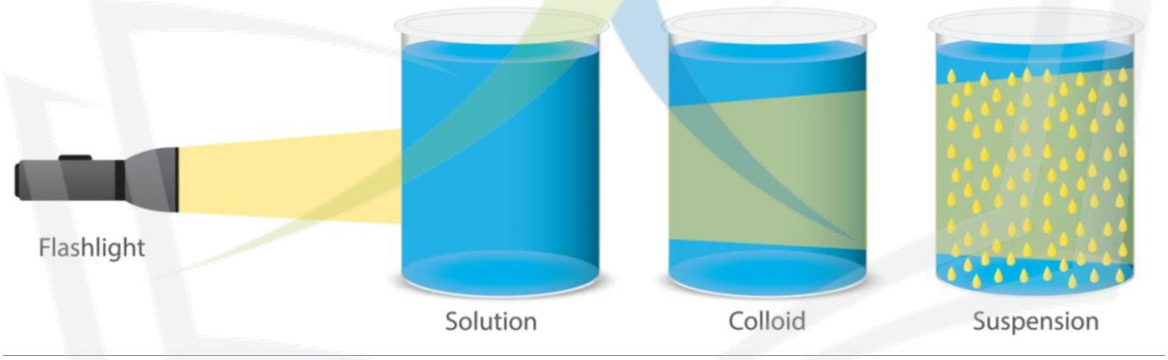
- Colloids are heterogeneous in nature.
- The particles of a colloid cannot be seen through naked eyes.

- The particles scatter a beam of light passed through a colloid and produce the Tyndall effect.
- Colloids are stable in nature. The particles of colloids do not settle down if left uninterrupted.
- We cannot separate the particles of a colloid through filtration. We use a method called **Centrifugation** to separate the particles of a colloid.

Tyndall Effect

The scattering of light (light beam) through a colloidal solution is referred to as the Tyndall effect. When particles in a colloid scatter light beams directed at them and make its path visible, this is known as the Tyndall effect. This effect can also be seen in some very fine suspensions.

For example, the Tyndall effect is exhibited by starch solution, milk, jelly, and fog as they are colloidal solutions. Other than Colloids fine suspensions like muddy water or chalk powder in water both show the Tyndall effect, but rocks in water are also a suspension but don't show the Tyndall effect.



Examples of Colloids

The properties of colloidal dispersions are closely linked to the high surface area of the dispersed phase and the chemistry of these interfaces. This natural combination of colloid and surface chemistry represents a major research space and we get to see a variety of categories of colloids based on these basic properties.

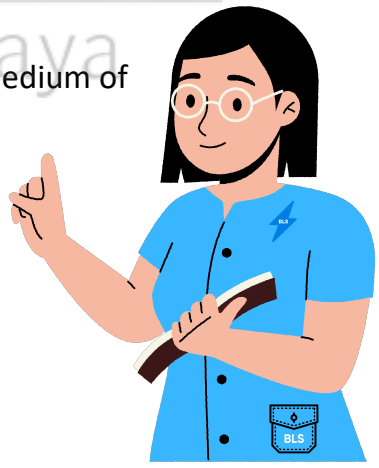
Examples: fog, smog, and sprays

The dispersed phase for the above examples is liquid and a dispersion medium of gas. These are usually termed as a liquid aerosol.

Examples: smoke and dust in the air

The dispersed phase for the above-mentioned examples is solid and the dispersion medium is gas. This is termed as a solid aerosol.

Examples: milk and mayonnaise



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The dispersed phase for the above-mentioned examples is liquid and the dispersion medium is liquid as well. The term used for these is an emulsion.

Examples: pigmented plastics

The dispersed phase for the above-mentioned example is solid and the dispersion medium is solid as well. The term used for such a mix is solid suspension.

Examples: silver iodide sol, toothpaste, and Au sol

The dispersed phase for the above-mentioned examples is solid and the dispersion medium being liquid. The term used for such colloidal solution paste at high temperature is sol.

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SEPARATING THE COMPONENTS OF A MIXTURE

Evaporation

Evaporation is used to separate a solid substance that has dissolved in water.

The dissolved substance is left as a residue when all the water has evaporated.

The use of process of evaporation for separating a mixture is based on the fact that liquid vaporise easily whereas solid do not vaporise easily.

For Example:

- Separation of common salt and water.

  The solution of common salt and water is taken in a china dish and heated gently by using a burner. The water present in salt solution will form water vapours and escape into atmosphere. When all the water present in the solution of common salt and water gets evaporated, then common salt is left behind in the china dish as a white solid.

  The process of evaporation is used on a large scale to obtain common salt from sea water.

  Evaporation is used for recovering dissolved solid substances from liquid mixtures but the liquid itself cannot be recovered by this method.

- The blue ink is a mixture of a dye in water.

  This dye is the coloured component of the ink. We can separate the coloured component of ink by the process of evaporation.

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Centrifugation

Centrifugation is a method of separating the suspended particles of a substance from a liquid in which the mixture is rotated at a high speed in a centrifuge.

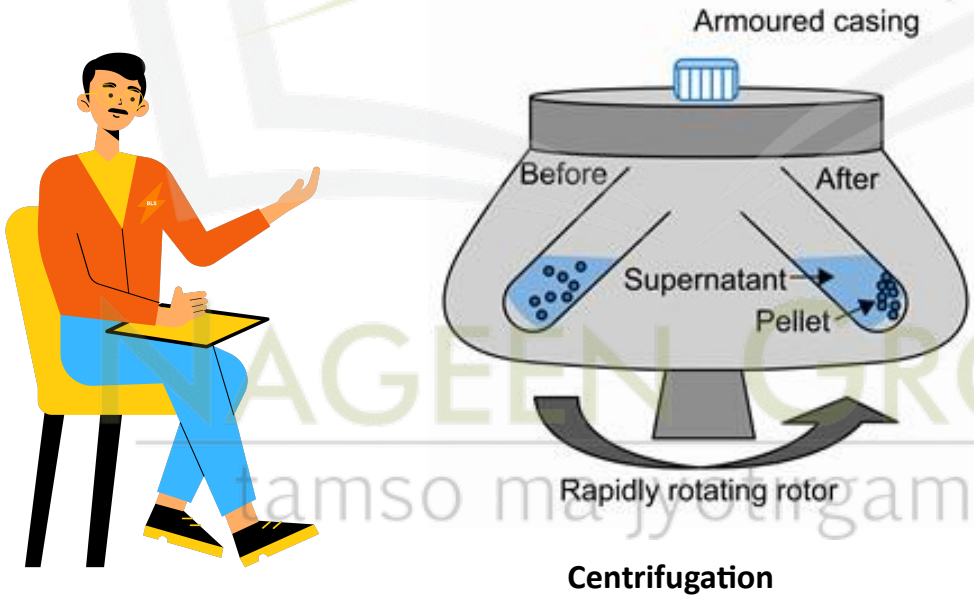
Centrifugation is done by using a machine called centrifugate.

In the method of centrifugation, the mixture of fine suspended particles in a liquid is taken a test tube. The test tube is placed in a centrifuge machine and rotated rapidly for some time. As the mixture rotates rapidly, a force acts on the heavier suspended particles in it and brings them down o the bottom of the test tube. The clear liquid, being lighter, remains on the top.

We can separate the clay particles suspended in water very rapidly by centrifugation.

Milk is a suspension of tiny droplets of oil in a watery liquid. The process of centrifugation is used in dairies to separate cream from milk. The milk is put in a closed container in big centrifuge machine. When the centrifuge machine is switched on, the milk is rotated at a very high speed in its container. Due to this, the milk separates into cream and skimmed milk.

The process of centrifugation is also used in washing machines to squeeze out water from wet clothes and make them dry.



Centrifugation

Separation by separating funnel

A mixture of two immiscible liquids can be separated by using a separating funnel.

A separating funnel is a special type of funnel which has a stopcock in its stem to allow the flow of a liquid from it, or to stop the flow of liquid from it. The separation of two immiscible liquids by a separating funnel depends on the differences in their densities.

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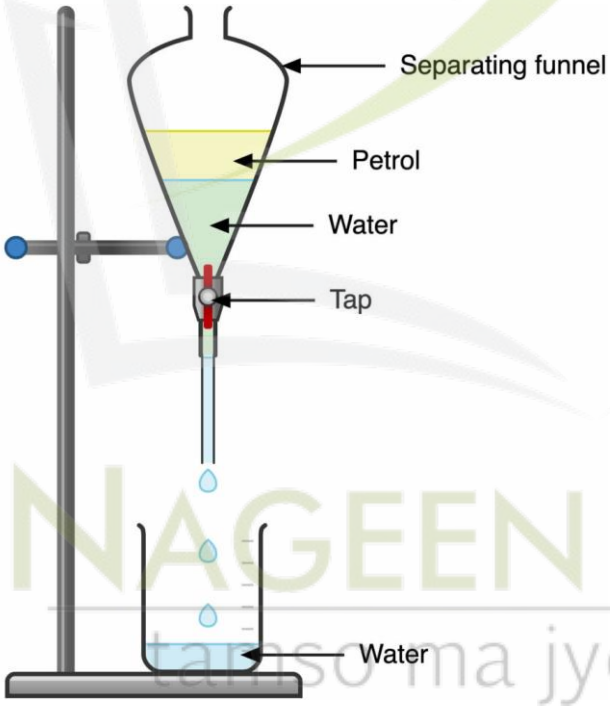
The mixture of two immiscible liquids is put in a separating funnel and allowed to stand for some time. The mixture separates into two layers according to the densities of the liquid in it. The heavier or denser liquid forms the lower layer whereas the lighter liquid forms the upper layer. On opening the stop cock of separating funnel, the lower layer of heavier liquid comes out first and collected in a beaker. When the lower layer of heavier liquid is completely run off, the stop cock is closed. The lighter liquid in the upper layer is collected in a separate beaker by opening the stop cock again.

For Example: water and kerosene, petrol and water, oil and water, benzene and ether etc. can be separated by using separating funnel.

When the mixture of water and kerosene is put in a separating funnel, it forms two layers. Water being heavier, forms the lower layer in the separating funnel whereas kerosene being lighter forms the upper layer. On opening the stop cock of separating funnel, the lower layer of water comes out first and collected in a beaker. When water layer has completely run off, then stop cock is closed. the kerosene is left behind in the separating funnel. It can be removed in a separate beaker by opening the stop cock again.



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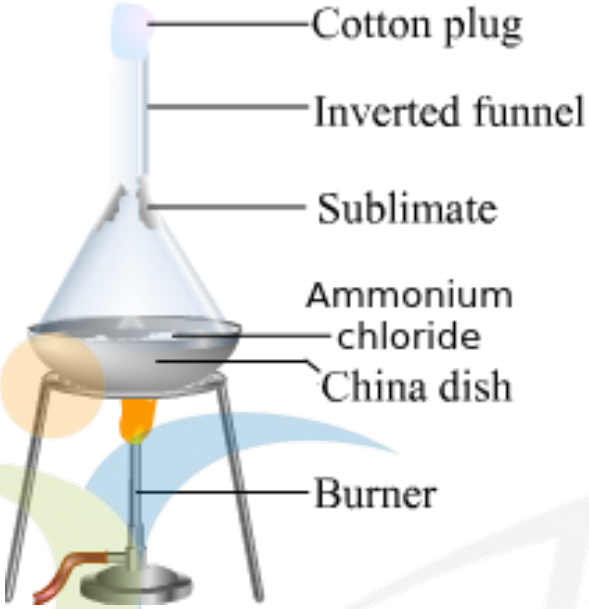
Sublimation

To separate a sublimable component from a non-sublimable component



Applications:

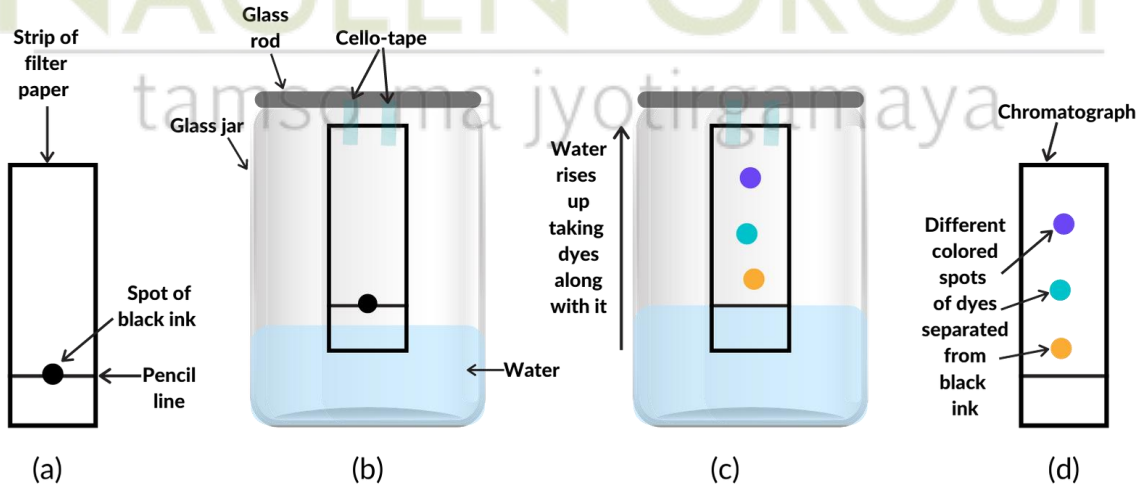
Ammonium chloride/camphor/naphthalene and salt

Method:

Heat the mixture in an inverted funnel so that the sublimable component sublimes in the air and settles over the walls of the funnel and the non-sublimable component, on the other hand, is left behind.

Chromatography

Chromatography is a technique used to affect the separation of two or more dissolved solids contained within a solution in very small quantities. In Greek, the word 'chroma' means colour and 'graphein' is used to indicate writing. Initially, the technique was used for the separation of colors.



Applications:

- Separating colour components of a dye
- Drugs from blood

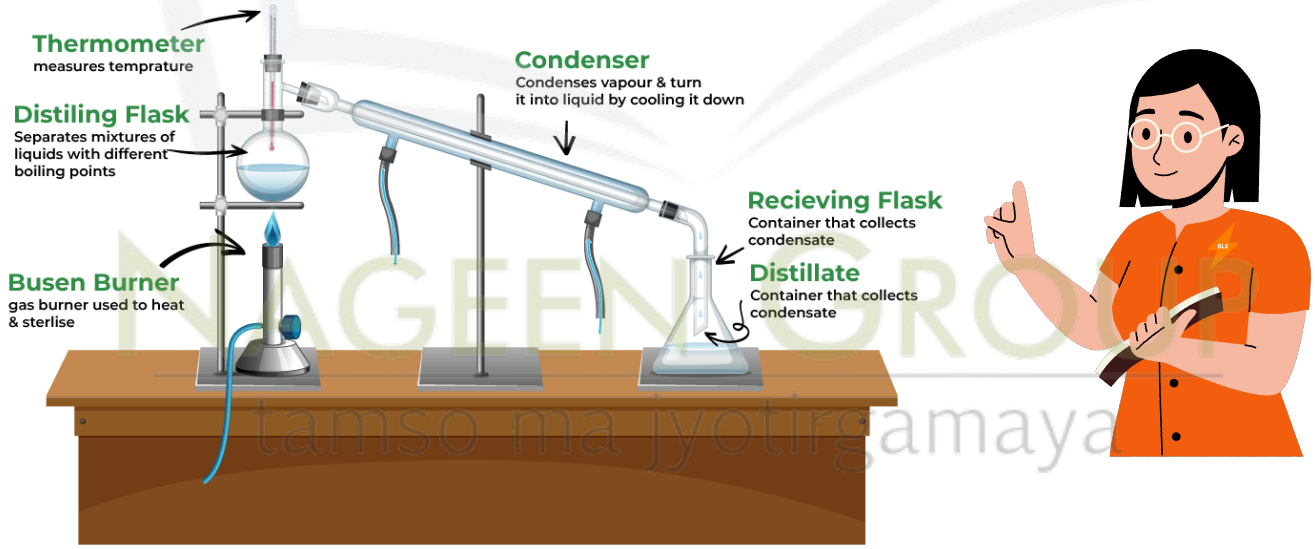
Method:

Take a filter paper or a blotting paper and place a drop of ink at the rear end. Dip the end in water. Since the ink is a mixture of two or more colours, the component of ink which is soluble in water mixes into it and then separates quickly from the other components that are less soluble in water.

Distillation

Distillation is the method of separating mixtures, in which the conversion of a liquid into vapour is afterwards condensed back to liquid form. distillation method is used for the purification of metals. Distillation is preferable where both solid and liquid have to be extracted from the solution. Also known as simple distillation, it is based on the differences noticed in the volatility and corresponding vapour pressures observed in the components of a mixture.

Distillation is a separation technique that is used to extract a mixture of solids in a liquid. It is basically the process of heating the liquid to form vapors, and then condensing the vapors in order to get back the liquid. The liquid that is obtained by performing the condensation of vapor is called the distillate.



Applications:

Acetone and water

Method:

The mixture is heated in a distillation apparatus. The one substance with a lower boiling point evaporates first, condenses and gets separated from the one with a higher boiling point.

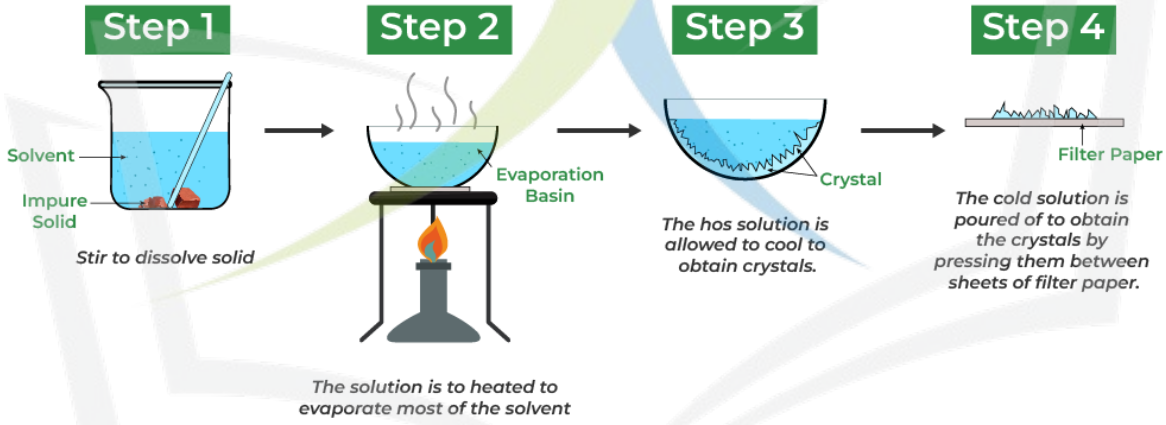
Simple Distillation: when the miscible liquids have a satisfactory difference in their boiling points

Fractional Distillation: when the difference between the boiling points of the liquids is less than 25K

Crystallisation

Crystallization is a natural process that happens when the materials solidify from a liquid, it can also occur when a solid precipitates from a liquid or gas. The crystallization process occurs resulting in a change in the physical property of the liquid, such as the change in temperature, change in its acidity.

The crystallization process is carried out on the basis of the size and shapes of the molecules involved, and their chemical properties. Crystals can be made out of 1 species of atom, different species of ions, or even huge molecules like proteins. The unit cell is the smallest unit of the crystal. It is the base form of atoms or molecules upon which more units can be attached.


Step 1
Step 2
Step 3
Step 4
Solvent
Impure Solid
Stir to dissolve solid
Evaporation Basin
The solution is to heated to evaporate most of the solvent
Crystal
The hos solution is allowed to cool to obtain crystals.
Filter Paper
The cold solution is poured of to obtain the crystals by pressing them between sheets of filter paper.

Applications:

- Salt from seawater
- Purification of copper sulphate

Method:

- The impurities of a substance are filtered out.
- Water is evaporated to obtain a saturated solution.
- The solution is covered with filter paper and left as it is.
- After some time, the crystals of pure solid are formed.

Purification of drinking water

Water is carried through canals or lengthy pipelines in a water purification system, which contains various pollutants and suspended particles from rivers and lakes. River water is commonly used to supply cities with drinking and dining water. This water is unsafe for drinking or dining because it

contains a high concentration of suspended pollutants and potentially hazardous microorganisms including bacteria and germs.

Water purification is the process of removing unwanted chemical compounds, organic and inorganic elements, and biological pollutants from water.

Stage 1: The water is gathered from rivers and lakes using canals or long pipes.

Stage 2: It is placed in the sedimentation tank, which allows all solid particles to settle. When suspended materials and matter sink to the bottom of a container, the second stage begins. The longer the water stays undisturbed, the more solids will fall to the container floor due to gravity. The sedimentation process must occur continually and in vast sedimentation basins for a community water supply. Before the filtration and disinfection processes, this simple, low-cost application is required as a pre-treatment step.

Stage 3: It's transferred to a loading tank, where all of the dispersed particles can settle.

Stage 4: The water is then pumped into a three-layer filtration tank. The colloidal particles have dropped to the bottom of the water supply at this point, and the clean water is ready to be treated further. Filtration is required due to the presence of minute, dissolved particles such as dust, parasites, chemicals, viruses, and bacteria in clear water. Water travels through physical particles that vary in size and content during filtering. Sand, gravel, and charcoal are some of the most commonly used materials.

Stage 5: The filtered water is then sent into a chlorination tank for disinfection, where it is combined with chlorine tablets to eliminate microorganisms in the water. The final step in the dining water treatment process is to add a disinfectant to the water supply, such as chlorine. Since the late 1800s, chlorine has been used. Mono-chloramine is the type of chlorine used in water treatment. This is not the same as the type that might contaminate interior air quality around swimming pools. The disinfection impact is to oxidise and remove organic matter, which stops parasites, viruses, and bacteria from spreading in the drinking water.

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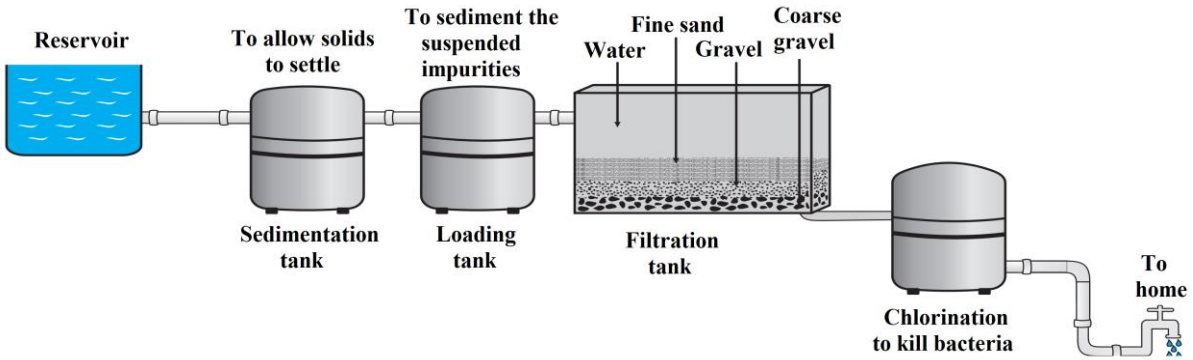


PHYSICAL AND CHEMICAL CHANGE

Physical Changes

The changes in which no new substance are formed are called physical changes.

In a physical change, the substances involved do not change their identity. They can be easily returned to their original form by some physical changes.

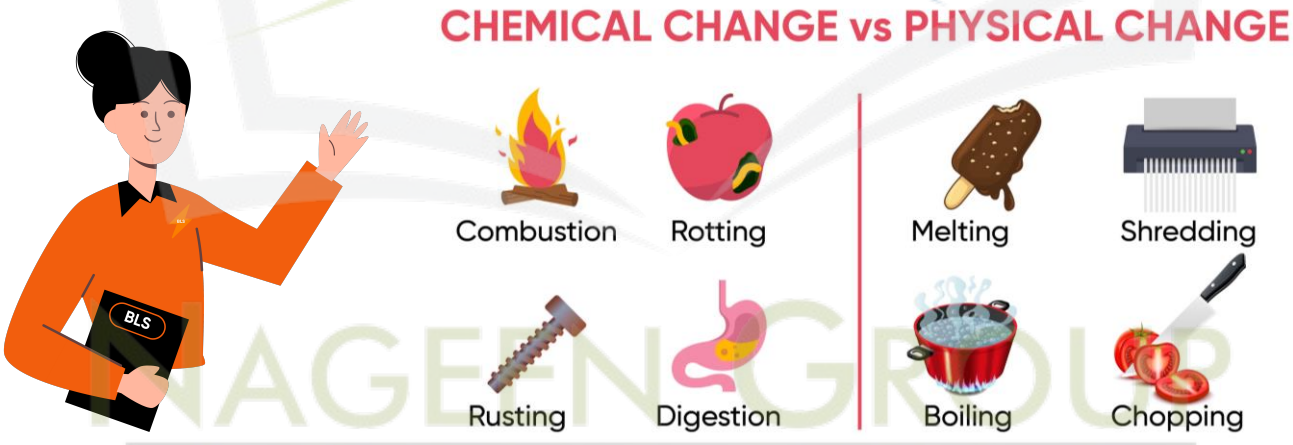
For Example: Freezing of water, Boiling of water, Condensation of steam, Making a solution, Glowing of electric bulb, stretching of rubber band, cutting or tearing a piece of paper etc.

Chemical Changes

The changes in which new substance are formed, are called chemical changes.

In a chemical change, the substances involved change their identity i.e. they get converted into entirely new substance.

For Example: Burning of magnesium ribbon, Rusting of iron, Formation of curd from milk, Cooking of food etc.



Physical change	Chemical Change
No new substance is formed in the physical change.	A new substance is formed in a chemical change.
Physical change is temporary change.	A chemical change is a permanent change.
Physical change is reversible.	Chemical change is irreversible.
Very little heat or light energy is usually absorbed or given out in a physical change	A lot of heat or light energy is absorbed or given out in a chemical change.
The mass of a substance does not alter in a physical change	The mass of a substance does alter in a chemical change.

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Is Matter Around Us Pure

DPP-01

[Topic: Mixtures, Types of Mixtures, Solutions, Suspension and Colloidal Solutions]

Very Short Answer Type Questions

1. Name two solvents other than water that are being used at home. For what purpose(es) are they used for?
2. What does pure substance mean?
3. Which form of water is the purest form of water?
4. Which of the following statements are true for pure substances?
   (i) Pure substances contain only one kind of particles.
   (ii) Pure substances may be compounds or mixtures.
   (iii) Pure substances have the same composition throughout.
   (iv) Pure substances can be exemplified by all elements other than nickel.
   (a) (i) and (ii)
   (b) (i) and (iii)
   (c) (iii) and (iv)
   (d) (ii) and (iii)
5. Rusting of an article made up of iron is called:
   (i) corrosion and it is a physical as well as chemical change
   (ii) dissolution and it is a physical change
   (iii) corrosion and it is a chemical change
   (iv) dissolution and it is a chemical change
6. A mixture of sulphur and carbon disulphide is:
   (i) heterogeneous and shows Tyndall effect.
   (ii) homogeneous and shows Tyndall effect.
   (iii) heterogeneous and does not show Tyndall effect.
   (iv) homogeneous and does not show Tyndall effect.
7. Tincture of iodine has antiseptic properties. This solution is made by dissolving
   (i) iodine in potassium iodide
   (ii) iodine in vaseline
   (iii) iodine in water
   (iv) iodine in alcohol
8. Which of the following are homogeneous in nature?
   (i) ice
   (ii) wood
   (iii) soil
   (iv) air
   (a) (i) and (iii)
   (b) (ii) and (iv)

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(c) (i) and (iv)
(d) (iii) and (iv)

9. Which of the following are physical changes?
(i) Melting of iron metal
(ii) Rusting of iron
(iii) Bending of an iron rod
(iv) Drawing a wire of iron metal
(a) (i), (ii) and (iii)
(b) (i), (ii) and (iv)
(c) (i), (iii) and (iv)
(d) (ii), (iii) and (iv)

10. Which of the following are chemical changes?
(i) Decaying of wood
(ii) Burning of wood
(iii) Sawing of wood
(iv) Hammering of a nail into a piece of wood
(a) (i) and (ii)
(b) (ii) and (iii)
(c) (iii) and (iv)
(d) (i) and (iv)

11. Classify each of the following as homogeneous or heterogeneous mixtures: soda water, wood, air, soil, vinegar, filtered tea

12. How would you confirm that a colourless liquid given to you is pure water?

13. Which of the following materials fall into the category of a "pure substance"?
(i) Ice
(ii) Milk
(iii) Iron
(iv) Hydrochloric acid
(v) Calcium oxide
(vi) Mercury
(vii) Brick
(viii) Wood
(ix) Air.

14. Identify the solutions among the following mixtures:
(i) Soil
(ii) Sea water
(iii) Air
(v) Soda water
(iv) Coal

15. Which of the following will show "Tyndall effect"?
(i) Salt solution
(ii) Milk

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(iii) Copper sulphate solution
(iv) Starch solution

16. Two substances, A and B were made to react to form a third substance, A_2 B according to the following reaction:

$$2\ A + B \rightarrow A_2\ B$$

Which of the following statements concerning this reaction are incorrect?
(i) The product A_2 B shows the properties of substances A and B
(ii) The product will always have a fixed composition
(iii) The product so formed cannot be classified as a compound
(iv) The product so formed is an element
(a) (i), (ii) and (iii)
(b) (ii), (iii) and (iv)
(c) (i), (iii) and (iv)
(d) (ii), (iii) and (iv)

17. Two chemical species X and Y combine together to form a product P which contains both X and Y

$$X + Y \rightarrow P$$

X and Y cannot be broken down into simpler substances by simple chemical reactions. Which of the following concerning the species X, Y and P are correct?
(i) P is a compound (ii) X and Y are compounds
(iii) X and Y are elements
(iv) P has a fixed composition
(a) (i), (ii) and (iii)
(b) (i), (ii) and (iv)
(c) (ii), (iii) and (iv)
(d) (i), (iii) and (iv)

18. State any one difference between pure and impure substances.
19. What are the two components of a solution?
20. How can you convert a saturated solution into an unsaturated solution?
21. Write the dispersed phase and dispersion medium in an emulsion.
22. Give two examples of suspension.
23. Choose the chemical change out of the following:
Digestion of food, Freezing of water, Glowing of electric lamp, Mixing of iron fillings with sulphur.
24. Which type of solution is formed when milk and water is mixed uniformly?
25. Give one example for each of the following:
(i) Aerosol
(ii) Solution

Short Answer Type Questions-1

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26. List the points of differences between homogeneous and heterogeneous mixture. [NCERT]
27. A solution contains 40 g of common salt in 320 g of water. Calculate the concentration in terms of mass by mass percentage of the solution.
28. To make a saturated solution, 36 g of sodium chloride is dissolved in 100 g of water at 293 K. Find its concentration at this temperature.
29. Explain the following giving examples:
    (i) saturated solution
    (ii) pure substance
    (iii) colloid
    (iv) suspension
30. Classify the following into elements, compounds and mixtures.
    (i) Sodium
    (ii) Soil
    (iii) Sugar solution
    (iv) Silver
    (v) Calcium carbonate
    (vi) Tin
    (vii) Silicon
    (viii) Coal
    (ix) Air
    (x) Soap
    (xi) Methane
    (xii) Carbon dioxide
    (xiii) Blood
31. Which of the following are chemical changes?
    (i) Growth of a plant
    (ii) Rusting of iron
    (iii) Mixing of iron filings and sand
    (iv) Cooking of food
    (v) Digestion of food
    (vi) Freezing of water
    (vii) Burning of a candle
32. Give the names of element present in:
    (i) Calcium oxide
    (ii) Hydrogen chloride
    (iii) Baking soda
    (iv) Potassium nitrate
33. Define a solution. Give an example of
    (i) gas in liquid solution
    (ii) gas in gas solution.
34. How many litres of 15% (mass/volume) sugar solution would it take to get 75 g of sugar?
35. Name the dispersed phase and dispersion medium and the type of colloid:
    (i) Fog
    (ii) Milk

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36. (i) What are heterogeneous mixtures?
    (ii) Why mixture do not have fixed melting or fixed boiling points?
37. What volume of ethyl alcohol and water must be mixed to prepare 250 mL solution of 60% by volume of alcohol in water.
38. What are gels? Give some examples.

Short Answer Type Questions-II

39. You are provided with salt solution, milk and muddy water. How can you differentiate between them on the basis of: (i) Homogeneity, (ii) Filtration, (iii) Tyndall effect.
40. (i) 20 g of sodium chloride is dissolved in 100 mL of water. How will you test whether it is saturated or unsaturated at a given temperature?
    (ii) Suggest one method by which we can increase the solubility of saturated solutions.
    (iii) Name the two components of colloids.

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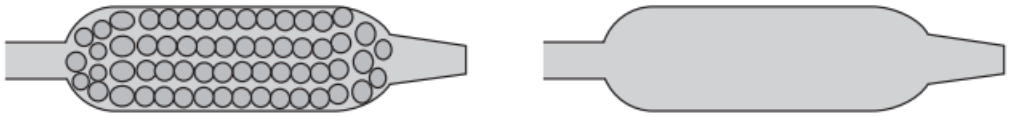
Is Matter Around Us Pure

DPP-02

[Topic: Separating Components of a Mixture, Physical and Chemical Changes, Elements, Compounds and Mixtures]

Very Short Answer Type Questions

1. Which of the tubes in Fig. (a) and (b) will be more effective as a condenser in the distillation apparatus?



2. Salt can be recovered from its solution by evaporation. Suggest some other technique for the same?
3. Have you seen dust particles from clothes settled at the bottom of a washing tub. Do you know why?
4. Name the process for the separation of different components of air.
5. How is air liquified?
6. Name two gases which are soluble in water.
7. A solution is prepared by adding 40 g of sugar in 100 g of water. Calculate the concentration in terms of mass by mass percentage of solution.
8. Fishes prefer to go deep in water during daytime. Why?
9. Calculate the amount of glucose required to prepare 250 g of 5% solution of glucose by mass.
10. What are the favourable qualities given to gold when it is alloyed with copper or silver for the purpose of making ornaments?
11. Sucrose (sugar) crystals obtained from sugarcane and beetroot are mixed together. Will it be considered a pure substance or a mixture? Give reasons for the same.
12. What term is given to a mixture having uniform composition and no distinct components?

Short Answer Type Questions-I

13. A student was having a beaker full of muddy water. He put a whitish stone like substance in it and suddenly the mud settled down. What is this white substance and what do we call this process?

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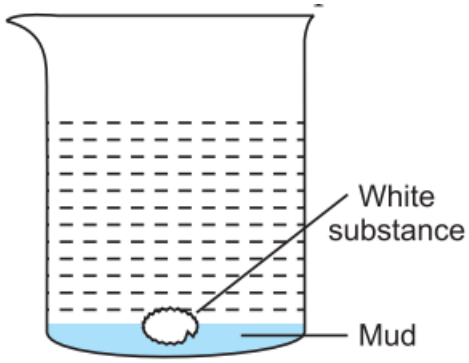

14. Work out a process for separating a mixture of sand, NH_4Cl and common salt?
15. The municipality water that we get in our homes may still have germs in it. What can we do in order to make it clean?
16. An athlete underwent a dope test and was found positive for drugs. What could be the process used to identify that his blood contained those drugs? Explain the principle and process.
17. (i) Name the metals which have no insoluble salts.
    (ii) Name one other group of salts which are always soluble.
18. What does this term mean? Give an example.
    (i) Filtrate
    (ii) Residue
19. You have a solution of sugar in water. You want to get sugar from it.
    (i) Explain, why filtration will not work.
    (ii) Which method will you use instead?
20. How do sol and gel differ from each other? Give one example.
21. Define solubility. How does solubility of a solid in water changes with temperature?
22. Two students ' A ' and ' B ' were given 10ml of water in a bowl and a plate, respectively. Name the student whose water evaporates faster and explain the reason.
23. Differentiate between an element and a compound. (Any two points). Write one example of each.
24. Identify the physical and chemical changes from the following:
    (i) Heating the mixture of iron and sulphur
    (ii) Ripening of fruits
    (iii) Dissolution of salt in water
    (iv) Rusting of iron chair
    (v) Making egg omelette
25. While diluting a solution of salt in water, a student by mistake added acetone (boiling point 56°C). What technique can be employed to get back the acetone? Justify your choice.
26. Explain why particles of a colloidal solution do not settle down when left undisturbed, while in the case of a suspension they do.
27. Smoke and fog both are aerosols. In what way are they different?

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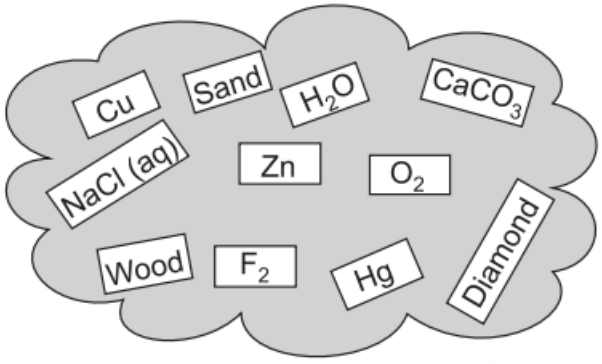
28. Classify the following as physical or chemical properties:
    (*i*) The composition of a sample of steel is: 98% iron, 1.5% carbon and 0.5% of other elements.
    (ii) Zine dissolves in hydrochloric acid with the evolution of hydrogen gas.
    (iii) Metallic sodium is soft enough to be cut with a knife.
    (iv) Most metal oxides form alkalies on reaction with water.
29. An element is sonorous and highly ductile. Under which category would you classify this element? What other characteristics do you expect the element to possess?
30. Give an example each for the mixture having the following characteristics. Suggest a suitable method to separate the components of these mixtures.
    (i) A volatile and a non-volatile component.
    (ii) Two volatile components with appreciable difference in boiling points.
    (iii) Two immiscible liquids.
    (iv) One of the components of the mixture changes directly from solid to gaseous state.
    (v) Two or more coloured constituents soluble in the same solvent.
31. Classify the substances given in below figure into elements and compounds.



32. Suggest separation technique(s) one would need to employ to separate the following mixtures:
    (i) Mercury and water
    (ii) Potassium chloride and ammonium chloride
    (iii) Common salt, water and sand
    (iv) Kerosene oil, water and salt

Short Answer Type Questions-II

33. Write the basic principles behind:
    (i) Chromatography
    (ii) Crystallisation
    (iii) Distillation
    (iv) Centrifugation
34. What is full cream, toned and double toned milk?
35. Explain the following terms in your own words:
    (i) Soluble
    (ii) Insoluble
    (iii) Aqueous solution

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36. How will you separate sugar and salt from the from the mixture of their aqueous solutions? What precaution should we take?

37. (i) Define Tyndall effect.
    (ii) Why is water considered a compound? Mention two points.

38. Write down the processes involved in sequential order to get the supply of drinking water to your home from waterworks.

39. Why is inter-conversion of states is a physical change? Give three reasons.

40. (i) Define an element.
    (ii) What is meant by malleability? Name two substances which are malleable.

41. A student was given a mixture of iron filings and sulphur? He was told to heat it and observe the compound:
    (i) What is the colour of the compound formed?
    (ii) Write the effect of magnet on it.
    (iii) Write the action of carbon disulphide on it.
    (iv) Describe the effect of adding dilute HCl to it. Identify the gas evolved and write two of its properties.

42. The teacher instructed three students ' *A* ', ' *B* ' and ' C ' respectively to prepare a 50% (mass by volume) solution of sodium hydroxide (NaOH). ' A ' dissolved 50 g of NaOH in 100 mL of water, ' B ' dissolved 50 g of NaOH in 100 g of water while ' C ' dissolved 50 g of NaOH in water to make 100 mL. Who has made the solution correctly?

43. Name the process associated with the following:
    (i) Dry ice is kept at room temperature and at one atmospheric pressure.
    (ii) A drop of ink placed on the surface of water contained in a glass spreads throughout the water.
    (iii) A potassium permanganate crystal is placed in a beaker and water is poured into the beaker with stirring.
    (iv) Acetone bottle is left open and the bottle becomes empty.
    (v) Milk is churned to separate cream from it.
    (vi) Settling of sand when a mixture of sand and water is left undisturbed for sometime.
    (vii) Fine beam of light entering through a small hole in a dark room, illuminates the dust particles in its path.

44. On heating, calcium carbonate gets converted into calcium oxide and carbon dioxide.
    (i) Is it a physical or a chemical change?
    (ii) Can you prepare one acidic and one basic solution by using the products of the reaction.

45. What would you observe when:
    (i) a saturated solution of potassium chloride prepared at 60°C is allowed to cool to room temperature.
    (ii) an aqueous sugar solution is heated to dryness.
    (iii) a mixture of iron filings and sulphur powder is heated strongly.

46. Suggest suitable methods used for separating
    (i) Husk from wheat
    (ii) Sand from water

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(iii) Stones from daal (pulses)
(iv) Camphor powder and common salt powder
(v) Butter from milk
(vi) Pure potash alum from impure potash alum (Phitkari)

47. Which of the following are not compounds?
(i) Chlorine gas
(ii) Potassium chloride
(iii) Iron
(iv) Iron sulphide
(v) Aluminium
(vi) Iodine
(vii) Carbon
(viii) Carbon monoxide
(ix) Sulphur powder

Long Answer Type Questions

48. Look at the following table:

	Compound	**Mass (g) dissolved in 100 g of water of 25°C**
1.	$AgNO_3$	241.3
2.	$Ca(NO_3)_2$	102.1
3.	Sugar (glucose)	91.0
4.	KNO_3	37.9
5.	K_2SO_4	12.0
6.	$Ca(OH^2$	0.113
7.	CaCO	0.0013
8.	AgCl	0.0002

(i) Which substance among them is most soluble?
(ii) About how many times more soluble is this substance than K_2SO_4 at 25°C ?
(iii) The substance in (a) gives a colourless solutions. What will be seen if we add 300 g of it to 100 g of water at 25° ?
(iv) What will you see if you heat up the mixture?

49. How would you obtain pure water from sea water?
50. Name the principle used to separate kerosene and water. Draw a neat and labelled diagram of the

apparatus used in this separation.

51. Fill in the blanks

    (i) A colloid is a _____mixture and its components can be separated by the technique known as _____
    (ii) Ice, water and water vapour look different and display different properties but they are _____the same.
    (iii) A mixture of chloroform and water taken in a separating funnel is mixed and left undisturbed for sometime. The upper layer in the separating funnel will be of and the lower layer will be that of _____
    (iv) A mixture of two or more miscible liquids for which the difference in the boiling points is less than 25 K can be separated by the process called _____
    (v) When light is passed through water containing a few drops of milk, it shows a bluish tinge. This is due to the _____of light by milk and the phenomenon is called This indicates that milk is a _____solution.

52. Non metals are usually poor conductors of heat and electricity. They are non-lustrous, non-sonorous, non-malleable and coloured.
    (i) Name a lustrous non-metal.
    (ii) Name a non-metal which exists as a liquid at room temperature.
    (iii) An allotropic form of a non-metal is a good conductor of electricity. Name the allotrope.
    (iv) Name a non-metal which is known to form the largest number of compounds.
    (v) Name a non-metal other than carbon which shows allotropy.
    (vi) Name a non-metal which is required for combustion.

53. How can we separate alcohol from water? Explain the whole process with a labelled diagram?

54. Explain the techniques used in the following figures:

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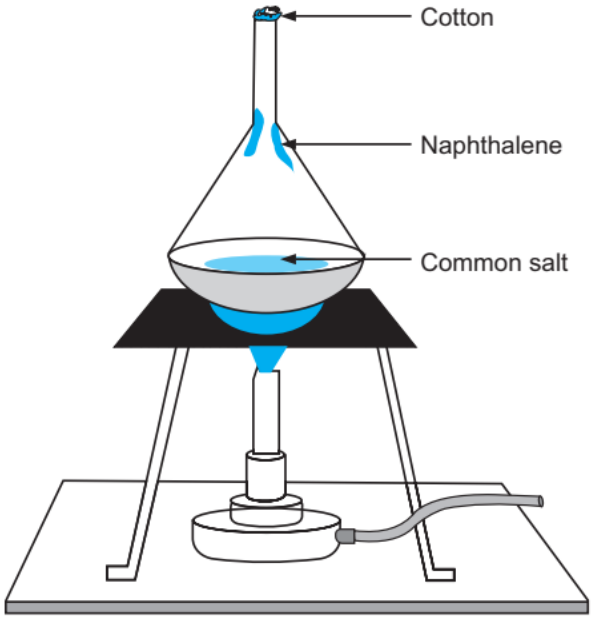
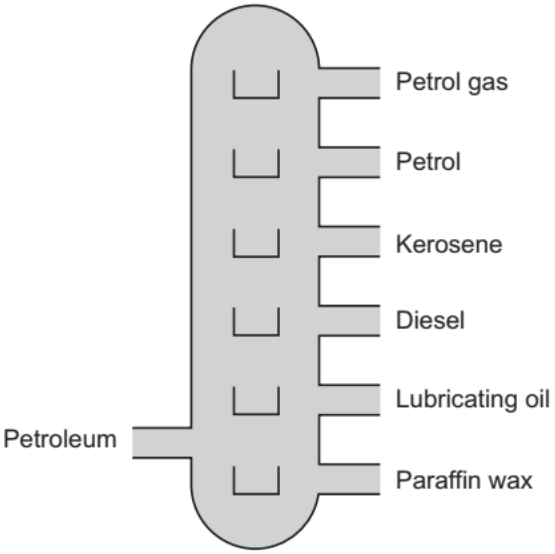


(*i*)



(*ii*)

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02

IS MATTER AROUND US PURE

INTRODUCTION

(Practice Sheet)

1 **What is matter?**

A. Anything that takes up space
B. Anything with mass
C. Both a and b
D. Neither a nor b

2 **Which of the following is an example of a pure substance?**

A. Mixture
B. Salt
C. Solution
D. Colloid

3 **What defines pure substances as elements or compounds?**

A. Homogeneity
B. Heterogeneity
C. Composition
D. State

4 **Which of the following is a metal?**

A. Carbon
B. Iron
C. Sulphur
D. Oxygen

5 **What is an alloy?**

A. Homogeneous mixture of metals
B. Heterogeneous mixture of metals
C. Compound of metals
D. Pure metal

6 Explain the difference between a pure substance and a mixture. Provide examples.

7 Explain homogeneous and heterogeneous mixture and give two examples of each.

8 Define concentration in a solution. How is it expressed, and what are the types of solutions based on concentration?

9 What is the Tyndall effect? Provide examples of substances exhibiting this effect.

10 Explain the difference between a suspension and a colloidal solution.

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02

IS MATTER AROUND US PURE

SEPARATING THE COMPONENTS OF A MIXTURE

(Practice Sheet)

1 **Which method is used to separate a solid substance dissolved in water?**

A. Chromatography **B.** Distillation

C. Centrifugation **D.** Evaporation

2 **What is the purpose of centrifugation in separating mixtures?**

A. Separating immiscible liquids **B.** Separating solids from liquids

C. Separating dissolved solids **D.** Separating gases

3 **How is a separating funnel used in mixture separation?**

A. Separating gases **B.** Separating immiscible liquids

C. Separating solids from liquids **D.** Separating dissolved solids

4 **What does chromatography primarily separate in a solution?**

A. Solid particles **B.** Gases

C. Dissolved solids **D.** Colored components

5 **What is the key factor in the crystallization process for separating substances?**

A. Solubility **B.** Density

C. Melting points **D.** Conductivity

6 Explain the process of evaporation with an example.

7 Describe the role of a separating funnel in separating immiscible liquids.

8 What is the significance of chlorination in water treatment?

9 How does centrifugation separate cream from milk in dairies?

10 Explain the method of separating components using a separating funnel.

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02

IS MATTER AROUND US PURE

PHYSICAL AND CHEMICAL CHANGE

(Practice Sheet)

1 **Which type of change involves the formation of a new substance?**

A. Physical change **B.** Chemical change

C. Both **D.** Neither

2 **What is a characteristic of physical changes?**

A. Formation of new substances **B.** Reversibility

C. Absorption of a lot of heat **D.** Change in identity

3 **In a chemical change, what happens to the mass of the substances involved?**

A. Mass increases **B.** Mass decreases

C. Mass remains the same **D.** Mass becomes zero

4 **Which process involves the burning of magnesium ribbon?**

A. Physical change **B.** Chemical change

C. Both **D.** Neither

5 **What is a characteristic of chemical changes?**

A. Reversibility **B.** Formation of new substances

C. No heat or light energy exchange **D.** Identity remains unchanged

6 Give an example of a physical change and explain why it is reversible.

7 Explain the concept of identity change in chemical changes with an example.

8 Why is the mass of a substance considered constant in a physical change?

9 Provide an example of a chemical change and describe why it is irreversible.

10 Differentiate between physical and chemical changes based on the exchange of heat or light energy.

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Chapter 2
Is Matter around Us pure

Multiple Choice Questions

1. Which of the following statements are true for pure substances?
(i) Pure substances contain only one kind of particles
(ii) Pure substances may be compounds or mixtures
(iii) Pure substances have the same composition throughout
(iv) Pure substances can be exemplified by all elements other than nickel

(a) (i) and (ii)
(b) (i) and (iii)
(c) (iii) and (iv)
(d) (ii) and (iii)

Soln

Answer is b) (i) and (iii)

2. Rusting of an article made up of iron is called
(a) corrosion and it is a physical as well as chemical change
(b) dissolution and it is a physical change
(c) corrosion and it is a chemical change
d) dissolution and it is a chemical change

Soln:

Answer is c corrosion and it is a chemical change.

Explanation :

Rusting of iron is corrosion and it's a chemical change because rust is a chemical compound called hydrate iron oxide $Fe_2O_3 . nH_2O$, iron(III) which is different from elemental iron.
Physical changes are those changes in which substance identity is not changed and it can get back to its original form ex: water freezing to ice can be melted back to water. Whereas chemical changes are those in which original substance identity is changed and they cannot be restored to their original form.

On adding solid solute is to the solvent, some solute dissolves and its concentration increases in solution. This process is known as dissolution.

Crystallization is a process in which Solute particles in solution collide with the solid solute particles to get separated out of solution.

3. A mixture of sulphur and carbon disulphide is

(a) heterogeneous and shows Tyndall effect
(b) homogeneous and shows Tyndall effect
(c) heterogeneous and does not show Tyndall effect
(d) homogeneous and does not show Tyndall effect

Soln:

A mixture of sulphur and carbon disulphide is a heterogeneous colloid and shows Tyndall effect. In a colloidal solution, the particles are big enough to scatter light. The scattering of light by colloidal particles is known as Tyndall effect. Colloids are actually heterogeneous in nature though they appear to be homogeneous.
Answer is a) heterogeneous and shows Tyndall effect.

Explanation:

A mixture of sulphur and carbon disulphide is heterogeneous and shows Tyndall effect because in a colloidal solution the particles are big enough to scatter light.

4. Tincture of iodine has antiseptic properties. This solution is made by dissolving

(a) iodine in potassium iodide
(b) iodine in vaseline
(c) iodine in water
(d) iodine in alcohol

Soln:

Answer is (d) iodine in alcohol

Explanation:

Tincture is prepared by using 2-7% elemental iodine and either of potassium iodide or sodium dissolved in alcohol. Since alcohol is a good solvent and iodine does not dissolve in water answer should be alcohol.

5. Which of the following are homogeneous in nature?
(i) ice
(ii) wood
(iii) soil
(iv) air

(i) and (iii)
(ii) and (iv)
(i) and (iv)
(iii) and (iv)

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Soln:

Answer is a) (i) and (iii)

Explanation

Air and ice are homogeneous mixture because its elements are not visible and cannot be distinguished from one another.

6. Which of the following are physical changes?

(i) Melting of iron metal
(ii) Rusting of iron
(iii) Bending of an iron rod
(iv) Drawing a wire of iron metal

(a) (i), (ii) and (iii)
(b) (i), (ii) and (iv)
(c) (i), (iii) and (iv)
(d) (ii), (iii) and (iv)

Soln:

Answer is (c) (i), (iii) and (iv)

Explanation

Rusting of iron is a chemical process where iron reacts with water and oxygen to produce iron oxide whereas others given processes are physical changes.

7. Which of the following are chemical changes?

(i) Decaying of wood
(ii) Burning of wood
(iii) Sawing of wood
(iv) Hammering of a nail into a piece of wood

(a) (i) and (ii)
(b) (ii) and (iii)
(c) (iii) and (iv)
(d) (i) and (iv)

Soln:

Answer is (a) (i) and (ii)

Explanation

Decaying of wood and burning of wood because there will be change of chemical composition and wood cannot be restored to its original form.
Sawing of wood and hammering of nail into a piece of wood are physical process where compounds chemical composition is not changed.

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8. Two substances, A and B were made to react to form a third substance, A2B according to the following reaction 2 A + B → A2 B which of the following statements concerning this reaction are incorrect?

(i) The product A2B shows the properties of substances A and B
(ii) The product will always have a fixed composition
(iii) The product so formed cannot be classified as a compound
(iv) The product so formed is an element

(a) (i), (ii) and (iii),
(b) (ii), (iii) and (iv)
(c) (i), (iii) and (iv)
(d) (ii), (iii) and (iv)

Soln:

Answer is (c) (i), (iii) and (iv)

Explanation:

A_2B is a compound made up of two elements A and B in a fixed ratio. The properties of a compound (e.g., A2B) are entirely different from those of its constituent elements (ie.g A and B). The composition of a compound is fixed.

9. Two chemical species X and Y combine together to form a product P which contains both X and Y X + Y → P X and Y cannot be broken down into simpler substances by simple chemical reactions. Which of the following concerning the species X, Y and P are correct?

(i) P is a compound
(ii) X and Y are compounds
(iii) X and Y
(iv) P has a fixed composition

(a) (i), (ii) and (iii),
(b) (i), (ii) and (iv)
(c) (ii), (iii) and (iv)
(d) (i), (iii) and (iv)

Soln:

Here X and Y cannot be further broken down into simpler substance. Hence X and Y are elements and P can be broken down to its elements hence P is a compound.

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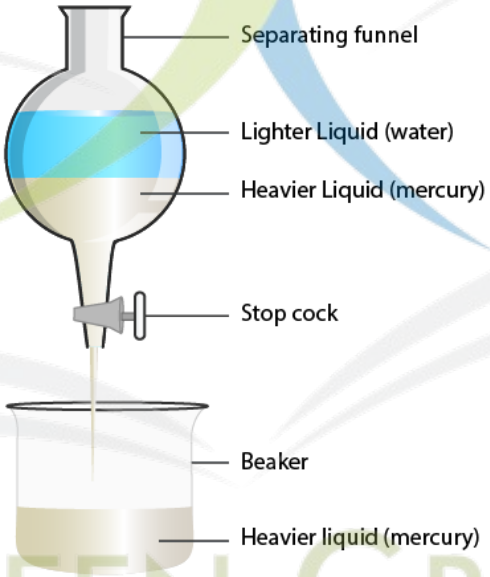
10. Suggest separation technique(s) one would need to employ to separate the following mixtures.
(a) Mercury and water
(b) Potassium chloride and ammonium chloride
(c) Common salt, water and sand
(d) Kerosene oil, water and salt

Soln:

Answers are a) decantation b) Sublimation c) Filtration and evaporation d) decantation

Explanation

a) Decantation method is used to separate the mixture of Mercury and water. Here Mercury is heavier than water hence it forms a separate layer which can be easily separated in separating funnel.



a) Potassium chloride and ammonium chloride are separated by sublimation method because ammonium chloride being a sublimate, sublies leaving behind the potassium chloride.

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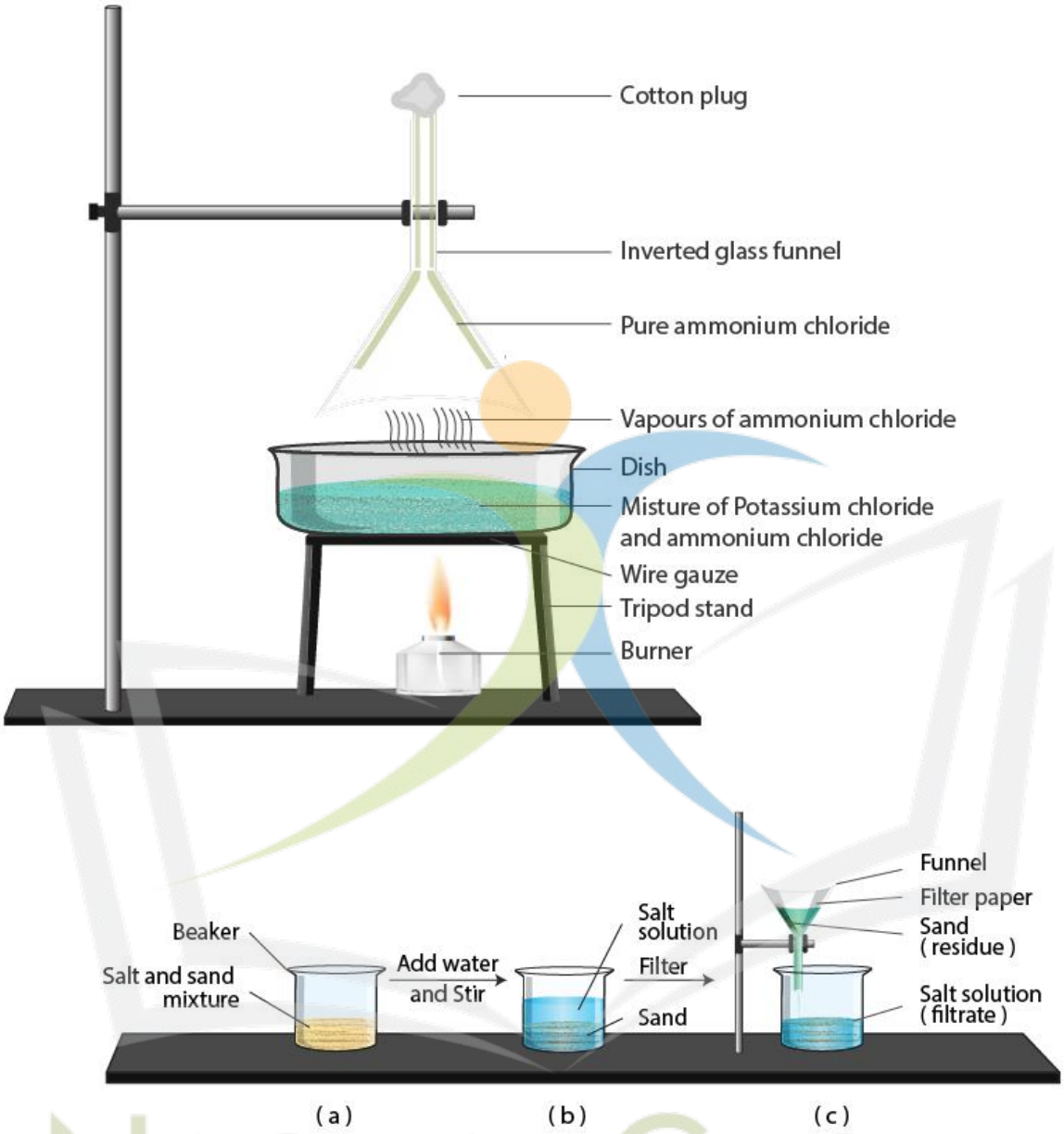

Seperation of salt and sand mixture

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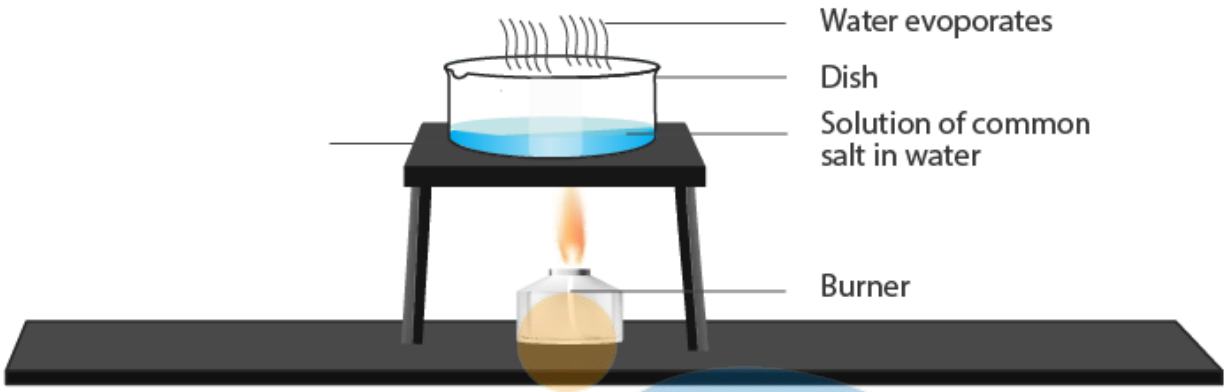
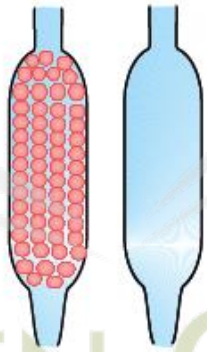
b) Common salt, water and sand are separated by filtration and evaporation processes. Common salt, water and sand are filtrated to separate the sand from salt solution. Then salt solution is heated to evaporate the water leaving behind salt.



Seperation of common salt dissolved in water by evoporation

11. Which of the tubes in Fig. 2.1 (a) and (b) will be more effective as a condenser in the distillation apparatus?



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Soln:
Answer is tube a

Explanation
Marbles in tube A increases the surface area that comes in contact with vapours. This gives more time for condensation of vapours hence tube A is an effective condenser than tube B.

12. Salt can be recovered from its solution by evaporation. Suggest some other technique for the same?

Soln:

Answer is crystallization

Explanation:

Salt can be recovered from its solution by crystallization. Crystallization is a more efficient process as it removes soluble impurities which cannot be done by evaporation.

13. The 'sea-water' can be classified as a homogeneous as well as heterogeneous mixture. Comment.
Soln

If we consider the sea water on the surface it comprises water and salts hence it is homogenous mixture. If we consider the sea water from deep sea it consists of salts, water, mud, decayed plants etc which will be heterogeneous mixture.

14. While diluting a solution of salt in water, a student by mistake added acetone (boiling point 56°C). What technique can be employed to get back the acetone? Justify your choice.

Soln:
Distillation can be used to separate acetone from the mixture of salt and water.

Explanation

There is considerable differences in the boiling points of acetone (56°C) and water (100°C). When the solution is heated acetone evaporates first which can be collected to obtain acetone.

15. What would you observe when

(a) a saturated solution of potassium chloride prepared at 60°C is allowed to cool to room temperature.
(b) an aqueous sugar solution is heated to dryness.
(c) a mixture of iron filings and sulphur powder is heated strongly.

Soln:

a) Sodium potassium chloride will separate out from the saturated solution when the temperature of the solution reduced from 60°C to room temperature. Solubility of the solid state is affected by the changed temperature.
b) When aqueous sugar solution is heated forst water gets evaporated upto some extent then sugar gets charred.
c) Iron combines with sulphur and forms iron sulphide (FES).

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16. Explain why particles of a colloidal solution do not settle down when left undisturbed, while in the case of a suspension they do.

Soln:

Size of the particles in suspension is relatively larger than size of the particles in a solution. Moreover in suspension molecular interaction is weaker to keep the molecules in suspended form. Hence the particles settle down. Similarly in colloidal solution molecular interaction is strong hence they remain in suspended form.

17. Smoke and fog both are aerosols. In what way are they different?

Soln:

Both smoke and fog have gas as the dispersion medium (continuous phase). But the difference lies in dispersed phase .Dispersed phase in fog is liquid whereas in smoke it is solid (particulate matter).

18. Classify the following as physical or chemical properties
(a) The composition of a sample of steel is: 98% iron, 1.5% carbon and 0.5% other elements.
(b) Zinc dissolves in hydrochloric acid with the evolution of hydrogen gas.
(c) Metallic sodium is soft enough to be cut with a knife.
(d) Most metal oxides form alkalis on interacting with water.

Soln:

Ans: Physical properties are a) and c). Chemical properties are b) and d)

Explanation

a) Composition of a sample of steel is: 98% iron, 1.5% carbon and 0.5% other elements. It is a chemical property because no new compound is formed as the steel is an alloy and alloy and is a homogeneous mixture of two or more metals or of metallic elements with non-metallic elements.
b) It is chemical property because zinc reacts with HCL to give out zinc chloride and Hydrogen gas.
c) Cutting knife will not involve any chemicals reaction and did not form new compound hence it is a physical property.
d) It is chemical property as new compound is form by the interaction of metal oxides with alkalis.

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19. The teacher instructed three students 'A', 'B' and 'C' respectively to prepare a 50% (mass by volume) solution of sodium hydroxide (NaOH). 'A' dissolved 50g of NaOH in 100 mL of water, 'B' dissolved 50g of NaOH in 100g of water while 'C' dissolved 50g of NaOH in water to make 100 mL of solution. Which one of them has made the desired solution and why?

Soln:

Answer is student C because both B and A has made the solution of 150ml whereas student C prepared required quantity.

Explanation
Student A and B prepare 150 ml solution, so student c make desire solution because he add water to make 100 ml solution. and from calculation,

$$\%w/v = \frac{100 \times \text{weight of sub (solute)}}{\text{volume of solution}}$$

$$\therefore \%50 = \frac{100 \times \text{weight of sub}}{100 \text{ ml}}$$

$$\text{weight of sub} = \frac{50 \times 100 \text{ ml}}{100}$$

$$\therefore \text{ weight of sub} = 50 \text{ g}$$

Here the 50g NaOH requred for 50% w/v 100ml solution of NaOH

20. Name the process associated with the following
(a) Dry ice is kept at room temperature and at one atmospheric pressure.
(b) A drop of ink placed on the surface of water contained in a glass spreads throughout the water.
(c) A potassium permanganate crystal is in a beaker and water is poured into the beaker with stirring.
(d) A acetone bottle is left open and the bottle becomes empty.
(e) Milk is churned to separate cream from it.
(f) Settling of sand when a mixture of sand and water is left undisturbed for some time.
(g) Fine beam of light entering through a small hole in a dark room, illuminates the particles in its paths

Soln:

Answers a) sublimation
b) Diffusion
c) Dissolution/ diffusion
d) Evaporation
e) Centrifugation
f) Sedimentation
g) Tyndall effect (Scattering of light)

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21. You are given two samples of water labelled as 'A' and 'B'. Sample 'A' boils at 100°C and sample 'B' boils at 102°C. Which sample of water will not freeze at 0°C? Comment.

Soln:

Answer is sample B
Explanation

Sample B may consists of impurities. At 1 atm boiling point of water is 100°C and freezing point is 0°C. Hence sample B which will not boil at 102°C will not freeze at 0°C.

22. What are the favourable qualities given to gold when it is alloyed with copper or silver for the purpose of making ornaments?

Soln:

Pure gold (24) karat) is soft and does not have strength. In order to give strength to gold silver and copper is alloyed to gold. An alloy that has 20 parts of gold and 4 parts of silver is known as 24 karat gold.

23. An element is sonorous and highly ductile. Under which category would you classify this element? What other characteristics do you expect the element to possess?

Soln:

An element which is sonorous and highly ductile can be classified as metal. Other characterised than can be expected are lustre, malleability, heat and electrical conductivity.

24. Give an example each for the mixture having the following characteristics. Suggest a suitable method to separate the components of these mixtures
(a) A volatile and a non-volatile component.
(b) Two volatile components with appreciable difference in boiling points.
(c) Two immiscible liquids.
(d) One of the components changes directly from solid to gaseous state.
(e) Two or more coloured constituents soluble in some solvent.

Soln:

It will be a pure substance because chemical structure of the sugar remains same despite of change in source of their extraction.

25. Fill in the blanks
(a) A colloid is a ——— mixture and its components can be separated by the technique known as ———.
(b) Ice, water and water vapour look different and display different —— properties but they are ——— the same.

(c) A mixture of chloroform and water taken in a separating funnel is mixed and left undisturbed for some time. The upper layer in the separating funnel will be of——— and the lower layer will be that of ———.
(d) A mixture of two or more miscible liquids, for which the difference in the boiling points is less than 25 K can be separated by the process called———.
(e) When light is passed through water containing a few drops of milk, it shows a bluish tinge. This is due to the ——— of light by milk and the phenomenon is called ——— . This indicates that milk is a ——— solution.

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Soln:

Answers
a) Heterogeneous
b) Physical

c) Water, Chloroform

d) Distillation
e) Scattering, Tyndall effect, colloidal

26. Sucrose (sugar) crystals obtained from sugarcane and beetroot are mixed together. Will it be a pure substance or a mixture? Give reasons for the same.

Soln:

It will be a pure substance because chemical structure of the sugar remains same despite of change in source of their extraction.

27. Give some examples of Tyndall effect observed in your surroundings?

Soln

1. The beam of light passing on screen in a theatre.
2. When light passes through a dark room.

28. Can we separate alcohol dissolved in water by using a separating funnel? If yes, then describe the procedure. If not, explain.

Soln:

We cannot separate alcohol dissolved in water by separating funnel as they both are miscible solvents.

29. On heating calcium carbonate gets converted into calcium oxide and carbon dioxide.
(a) Is this a physical or a chemical change?
(b) Can you prepare one acidic and one basic solution by using the products formed in the above process? If so, write the chemical equation involved

Soln:
Answers:

a) It is a chemical change

$CaCO_3 + H_2O \rightarrow CaO + CO_2$

b) Acidic and basic solutions can be prepared by dissolving the products of the above process in water
$CaO + H_2O \rightarrow Ca(OH)_2$ (basic solution) $CO_2 + H_2O \rightarrow H_2CO_3$ (acidic solution)

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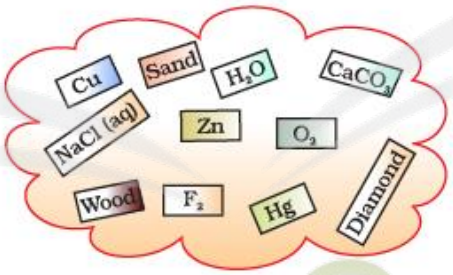
30. Non metals are usually poor conductors of heat and electricity. They are non-lustrous, non-sonorous, non-malleable and are coloured.
(a) Name a lustrous non-metal.
(b) Name a non-metal which exists as a liquid at room temperature.
(c) The allotropic form of a non-metal is a good conductor of electricity. Name the allotrope.
(d) Name a non-metal which is known to form the largest number of compounds.
(e) Name a non-metal other than carbon which shows allotropy.
(f) Name a non-metal which is required for combustion.

Soln:

Answers

a) **Iodine** is a lustrous non-metal.
b) **Bromine** is liquid at room temperature
c) **Graphite** is allotropic form of Carbon (non-metal) which is a good conductor of electricity.
d) **Carbon** is a non-metal which can form the largest number of compounds.
e) **Sulphur and Phosphorous** are the non-metals which shows allotropy.
f) **Oxygen** is a non-metal which is required for combustion.

31. Classify the substances given in Fig. 2.2 into elements and compounds



Soln:
Answer
Elements-Copper(Cu), Zinc(Zn), Oxygen(O2), Fluoride(F2), Mercury(Hg), Diamond
Compounds-NACL(Aq), Wood, Sand, H2O, CaCO3

32. Which of the following are not compounds?
(a) Chlorine gas
(b) Potassium chloride
(c) Iron
(d) Iron sulphide
(e) Aluminium
(f) Iodine
(g) Carbon

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(h) Carbon monoxide
(i) Sulphur powder

Soln:

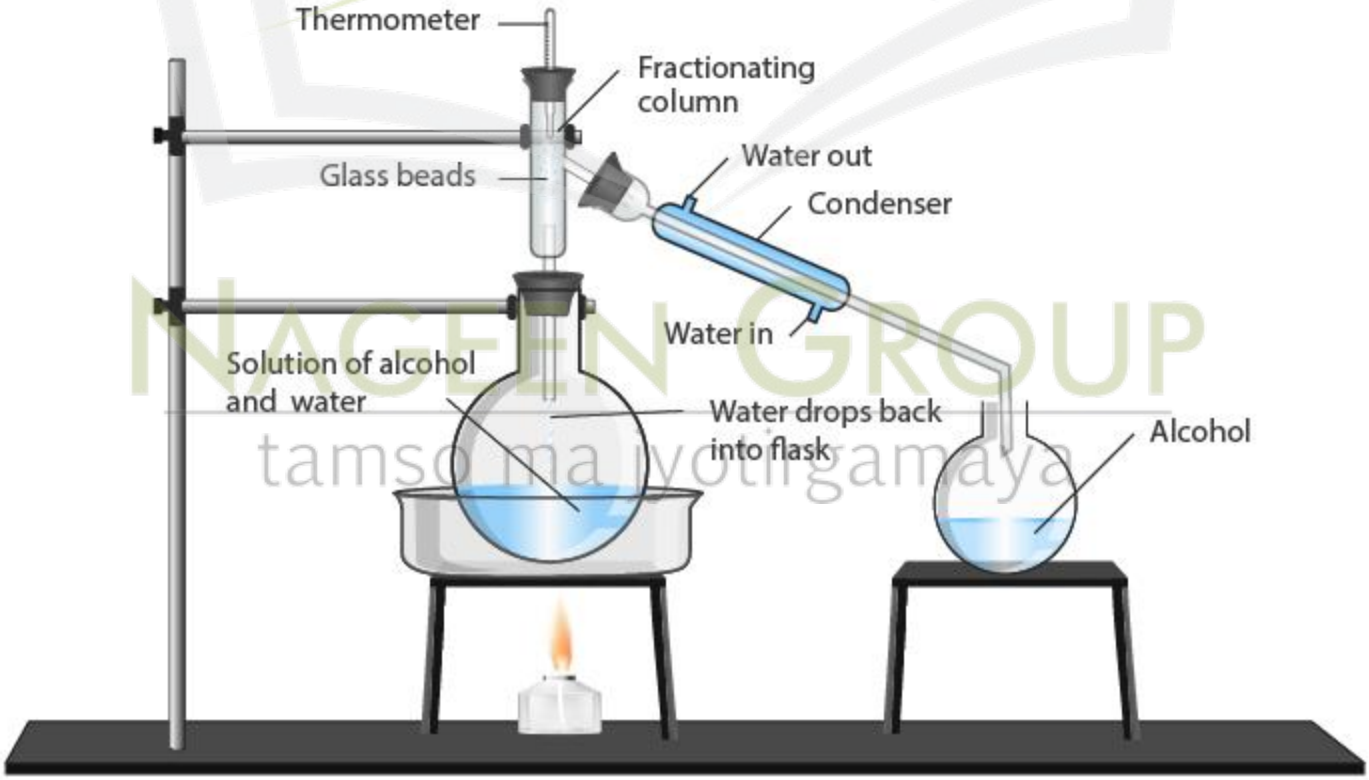
Answers
a.Chlorine gas
c.Iron
e. Aluminium
f. Iodine
g.Carbon
i.Sulphur powder

Long Answer Questions

33. Fractional distillation is suitable for separation of miscible liquids with a boiling point difference of about 25 K or less. What part of fractional distillation apparatus makes it efficient and possess an advantage over a simple distillation process. Explain using a diagram.

Soln:

Fractional column is the most important of fractional distillation apparatus. It is provided with glass beads in it. This column helps to obstruct the upward movement of the vapours of the two liquids. The vapours of high boiling liquid gets condensed earlier at lower level. Latent heat released helps to take the vapours of low boiling liquid to a height in the fractionating column.



Separation of miscible liquids

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The advantages are as
given below

1. This method can separate the liquids with a boiling point difference about or less than 25 K,
2. During the process, both evaporation and condensation take place simultaneously.

3. A mixture (like petroleum) can also be separated by fractional distillation process which contains several components.

34.
(a)Under which category of mixtures will you classify alloys and why?
(b) A solution is always a liquid. Comment.
(c) Can a solution be heterogeneous?

Soln:

a) An alloy is a homogenous mixture of two or more elements. Elements can be two metals or a metal with a non-metal.

An alloy is classified as a homogenous mixture because it shows properties of two or more elements it is made of. It constituents are in varied composition. Ex: Brass is an alloy which shows characteristics of copper and Zinc and their composition varies from 20 to 35 %.

b) No the solution cannot be always liquid

35. Iron filings and sulphur were mixed together and divided into two parts, 'A' and 'B'. Part 'A' was heated strongly while Part 'B' was not heated. Dilute hydrochloric acid was added to both the Parts and evolution of gas was seen in both the cases. How will you identify the gases evolved?

Soln:

When iron fillings and sulphur is heated it will give following reaction
$Fe(s)+S(s) \longrightarrow FeS$
When HCl is added to this mixture ferric chloride is produces and Hydrogen Sulphide gas is produced. Foul rotten egg smell of Hydrogen sulphide is the indicator of H_2S production.
When dilute HCL is added to setup B Hydrogen gas is evolved and sulphur does not take part in the reaction.
When a burning match stick is brought near the evolved gas, matchstick burns with a pop. This is the indication of production of Hydrogen gas.

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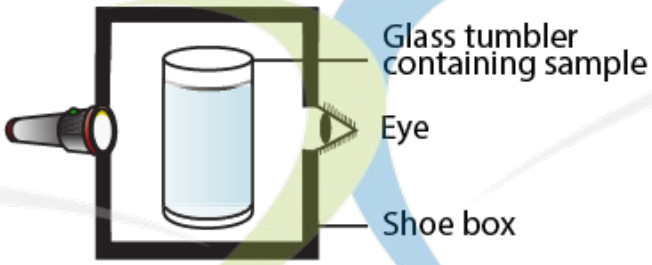
36. A child wanted to separate the mixture of dyes constituting a sample of ink. He marked a line by the ink on the filter paper and placed the filter paper in a glass containing water as shown in Fig.2.3. The filter paper was removed when the water moved near the top of the filter paper.
(i) What would you expect to see, if the ink contains three different coloured components?
(ii) Name the technique used by the child.
(iii) Suggest one more application of this technique.

Soln:

(i) If the ink contains three different coloured components then you can observe three different bands on the paper

(ii) Child uses the technique of paper chromatography
(iii) Paper chromatography is used to separate different pigments present in the chlorophyll.

37. A group of students took an old shoe box and covered it with a black paper from all sides. They fixed a source of light (a torch) at one end of the box by making a hole in it and made another hole on the other side to view the light. They placed a milk sample contained in a beaker/tumbler in the box as shown in the Fig.2.4. They were amazed to see that milk taken in the tumbler was illuminated. They tried the same activity by taking a salt solution but found that light simply passed through it?



(a) Explain why the milk sample was illuminated. Name the phenomenon involved.
(b) Same results were not observed with a salt solution. Explain.
(c) Can you suggest two more solutions which would show the same effect as shown by the milk solution?

Soln:

(a) Milk is a colloidal substance. Particulate matter present in the milk make the light scatter which results in Tyndall effect. Because of Tyndall effect the milk got illuminated.
(b) Salt is a homogenous solution. Small particles present in salt solution do not scatter light rays hence there will be no Tyndall effect. Since salt solution did not exhibit Tyndall effect light is not illuminated.
(c) Detergent solution and sulphur solution exhibit Tyndall effect.

38. Classify each of the following, as a physical or a chemical change. Give reasons.
(a) Drying of a shirt in the sun.
(b) Rising of hot air over a radiator.
(c) Burning of kerosene in a lantern.
(d) Change in the colour of black tea on adding lemon juice to it.
(e) Churning of milk cream to get butter.

Soln:

a) Drying of shirt in the sun is a physical phenomenon because there are no chemical reaction or any chemical changed involved in this process.
b) Rising of hot air over radiator is a physical change. Water in a radiator converts to vapours. Hot air becomes lighter and rises.
c) Burning of kerosene in a lantern is a chemical change because kerosene burns by using atmospheric oxygen and produces carbon dioxide.

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d) Change in the
colour of black
tea on adding lemon juice to it is a chemical change. Lemon juice is a source of citric acid, ascorbic acid and malic acid. This acid reacts Flavin antioxidants present in black tea to change colour of the tea.

e) Churning of milk cream to get butter is a physical change as there is no involvement of chemical reaction. Here the principal is of centrifugation which turn the milk cream to butter.

39. During an experiment the students were asked to prepare a 10% (Mass/Mass) solution of sugar in water. Ramesh dissolved 10g of sugar in 100g of water while Sarika prepared it by dissolving 10g of sugar in water to make 100g of the solution. (a) Are the two solutions of the same concentration (b) Compare the mass % of the two solutions.

Soln:

Mass % = Mass of solute Mass of solute + Mass of solvent ×100

Solution made by Ramesh

Mass % = 10/ 100 +10 x 100 = 10 /110 x100 = 9.09%

Solution made by Sarika Mass % = 10 /100 ×100 = 10%

The solution prepared by Sarika has a higher mass % than that prepared by Ramesh.

40. You are provided with a mixture containing sand, iron filings, ammonium chloride and sodium chloride. Describe the procedures you would use to separate these constituents from the mixture?

Soln:

a) Using Magnet: Move magnet over the mixture which will result in the sticking of iron fillings to magnet. Like this iron fillings get separated from mixture.
b) Sublimation: Remaining mixture is heated in a china dish. Ammonium chloride is a sublimating substance and it will evaporate without passing through liquid phase. Ammonium chloride can be collecting an inverted funnel over china-dish.
c) Sedimentation, decantation, filtration: Remaining mixture is dissolved in water and allowed to settle down. Sand will settle at the bottom. Liquid should be decanted to another beaker. Then it is filtered to remove traces of sand.
d) Filtered solution is heated to evaporate the water. Once all the water gets evaporated salt remains in the beaker.

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41. Arun has prepared 0.01% (by mass) solution of sodium chloride in water. Which of the following correctly represents the composition of the solutions?
(a) 1.00 g of NaCl + 100g of water
(b) 0.11g of NaCl + 100g of water
(c) 0.0l g of NaCl + 99.99g of water
(d) 0.10 g of NaCl + 99.90g of water

Soln:

Here,

$$\text{Mass\%} = \frac{\text{mass of solute} \times 100}{(\text{mass of solute} + \text{mass of solvent})}$$

$$= \frac{0.01\text{g} \times 100}{(0.01 + 99.99)\text{g}} = \frac{0.01 \times 100}{100.00} = 0.01\%$$

which is equal to the percentage of sodium chloride in water prepared by Arun. So, option (c) is correct.

In option (a), mass% = $\frac{1.00\text{g} \times 100}{(1.00 + 100)\text{g}} = \frac{1.00 \times 100}{101.00} = 0.99\%$

42. Calculate the mass of sodium sulphate required to prepare its 20% (mass percent) solution in 100g of water?
Soln:

In option (b), mass% = $\frac{0.11\text{g} \times 100}{(0.11 + 100)\text{g}} = \frac{11}{100.11} = 0.11\%$

In option (d), mass% = $\frac{0.1\text{g} \times 100}{(0.1 + 99.90)\text{g}} = \frac{10}{100} = 0.1\%$

Hence, other three representations are incorrect.

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Chapter - 2
Is Matter Around us Pure

Questions:

Q. 1 What is meant by a pure substance?

Ans.: A pure substance is a type of substance which constitute of only single type of particles and are homogeneous in nature (i.e same physical and chemical properties). Example:- Sulphur gas is made up of only one kind of Particles called Sulphur .

Q.2 List the points of differences between homogeneous and heterogeneous mixtures.

Ans.: The main points of difference between homogeneous mixtures and heterogeneous mixtures are as follows:

Homogeneous mixtures	**Heterogeneous mixtures**
(i) It has uniform composition throughtout its mass.	(i) it does not have a uniform composition throughout its mass.
(ii) It has no visible boundaries of separation between the various constituents.	(ii) it has visible boundaries of separation between the various constituents.
(iii). The constituents of a homogenous mixture cannot be seen easily. They consist of only one phase. For example, sugar and water mix together to form a homogeneous mixture called sugar solution.	(iii) The constituents of a heterogeneous mixture can usually be seen easily. They consist of more than one phase. For example, a mixture of water and sand is a hetergenous mixture.

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Questions:

Q. 1 Differentiate between homogeneous and heterogeneous mixtures with examples.

Ans.: (a) Homogeneous mixture:

The mixtures in which the substances are completely mixed together and are indistinguishable from each other are called homogeneous mixtures.

A homogeneous mixture has a uniform composition throughout its mass.

All the homogeneous mixtures are called solutions.

For example, a mixture of alcohol and water is a homogeneous mixture.

(b) Heterogeneous mixture:

A mixture which does not have a uniform composition throughout its mass.

It has visible boundaries of separation between the various constituents.

They consist of more than one phase.

For example, a mixture of water and sand is a heterogeneous mixture.

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Q.2 How are sol, solution and suspension different from each other?

Ans.: Sol, solution and suspension are different from each other in the following ways:

Sol	**solution**	**suspension**
The size of solute particles is between 1nm to 100 nm. The	The size of solute particles is less than 1 nm (10^{-9}m) hence,	The size of solute particles is more than 100 nm. The particled

particles cannot be seen with naked eyes.	they cannot be seen with naked eyes.	of suspension can be seen with naked eyes.
These are quite stable. The particled do not settle down when left undisturbed.	The solute particles do not settle down when left undisturbed, that is, a solution is stable.	The solute particled settle down when a suspension is left undisturbed therefore, a suspension is unstable.
Particles are big enough to scatter a beam of light passing through it and make its path visible.	Because of very small particled size, they do not scatter a beam of light passing through the solution. So, the path of light is not visible.	The particled of a suspension scatter a beam of light passing through it and make its path visible.
Solute particled are able to pass through the filter paper and cannot be separated through filtration.	The solute particled pass through the filter paper and cannot be separated from the mixture by the process of filtration.	Solute particled do not pass through filter paper. They can be separated from the mixture by the process of filtration.

Q. 3 To make a saturated solution, 36 g of sodium chloride is dissolved in 100g of water at 293 K. Find its concentration at this temperature.

Ans.:

Mass of solute (sodium chloride) =36g

Mass of solvent (water) =100g

Mass of solution = Mass of Solute + Mass of solvent

= 36g +100g= 136g

The concentration = Mass of solute / Mass of solution X 100

Concentration = (36/136) x 100

= 26.47%

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Questions:

Q.1 Classify the following as chemical or physical changes:

(i) cutting of trees

(ii) melting of butter in a pan

(iii) rusting of almirahs

(iv) boiling of water to form steam

(v) passing of electric current through water and the water breaking down into hydrogen and oxygen gases

(vi) dissolving common salt in water

(vii) making a fruit salad with raw fruits, and

(viii) burning of paper and wood

Ans.: Chemical changes are rusting of almirahs, passing of electric current through water and water breaking down into hydrogen and oxygen gases, burning of paper and wood. The chemical properties of all of these substances have changed and new substances have been formed as a result of these changes. Rust is an oxide of iron which is a new substance formed on the surface of almirah. Hydrogen and oxygen are also new compounds which are produced after passing electric current through water. Burning of paper is a chemical reaction which has changed in the chemical properties of paper.

Physical changes are melting of butter in a pan, cutting of trees, boiling of water to form steam, dissolving common salt in water and making a fruit salad with raw fruits. Physical changes occur without any change in chemical composition of a substance. Melting butter and boiling of water to form steam has only changed the physical states of these substances without causing any change in their chemical composition.

Q. 2 Try segregating the things around you as pure substances or mixtures.

Ans.: Some of the things around us are: Tap water, Milk, Naphthalene balls, Sodium chloride, Air, Gold ornaments, Ice-cream, Steel, Distilled

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water, Diamond, Steam, Kerosene oil, Alum, Salt solution, Brass, Alcohol, Vinegar. Graphite, Wood and Baking soda. We can segregate (or separate) these things as pure substances or mixture of as shown below:

Pure substances	Mixtures
Naphthalene, balls, Sodium chloride, distilled water, Diamond, Steam, Alum, Alcohol, Graphite and Baking Soda.	Tap Water, Milk, Air, Gold Ornaments, Ice-cream and steel.

A pure substance is made up of only one kind of particles. All the constituent particles of a pure substance are the same in their chemical nature. These particles may be atoms or molecules. All the elements and compounds are pure substances because they contain only one kind of particles. A pure substance cannot be separated into other kinds of matter by any physical process.

A mixture contains more than one substance, element and/or compound mixed in any proportion. Mixtures can be separated into pure substances using appropriate separation techniques.

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Exercise

Questions:

Q.1 Which separation technique will you apply for the separation of the following?

(a) Sodium chloride from its solution in water

(b) Ammonium chloride from a mixture containing sodium chloride and ammonium chloride

(c) Small pieces of metal in the engine oil of a car.

(d) Different pigments from an extract of flower petals.

(e) Butter from curd.

(f) Oil from water.

(g) Tea leaves from tea.

(h) Iron pins from sand.

(i) Wheat grains from husk.

(j) Fine mud particles suspended in water.

Ans.:

(a) Sodium chloride can be separated from its solution in water by the process of Evaporation. This solution is boiled or evaporated. After evaporation sodium chloride will be left behind.

(b) Ammonium chloride can be separated from a mixture containing sodium chloride and ammonium chloride by the process of 'Sublimation'. On heating this mixture, ammonium chloride changes directly from solid to gaseous state leaving behind sodium chloride. During this process, the solids form of ammonium chloride can be collected on the sides of the funnel.

(c) Small pieces of metal in the engine oil of a car can be separated by the process of 'Filtration'.

(d) Different pigments from an extract of flower petals can be separated by the process of 'Chromatography'. Chromatography is the technique which is used for separation of those solutes that dissolve in the same solvent.

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(e) Butter can be separated from curd by the process of Centrifugation. The principle behind this process is that the denser particles are forced to the bottom and the lighter particles stay at the top when spun rapidly.

(f) Oil can be separated from water by using 'Separating funnel'. Mixture of oil and water are poured in the funnel and are allowed to stand undisturbed for sometime. This results in the formation of separate layers of water and oil.

(g) Tea leaves from tea can be separated by filtration.

(h) Iron pins can be separated from sand by using a magnet.

(i) Wheat grains can be separated from husk by Winnowing. It is a very simple process in which the wheat grains are thrown into the air, so that the wind blows away the lighter husk.

(j) Mud particles suspended in water can be removed by decantation and filtration.

Q. 2 Write the steps you would use for making tea. Use the words solution, solvent, solute, dissolve, soluble, insoluble, filtrate and residue.

Ans.: Tea can be prepared by the following steps:

1) Take a cup of water in a pan and heat it on a gas burner. The water acts as a solvent. Allow the water to boil.

2) Now add a spoonful of sugar in the water. Sugar is a solute. Heat till all the sugar is dissolved in water.

3) We will get a solution of sugar and water.

4) To the solution of sugar and water add a teaspoon of tea leaves. Tealeaves are insoluble in water.

5) Allow the contents to boil and then add milk to the solution and boil again. Milk is also soluble in water.

6) Filter the tea leaves from the solution with the help of a strainer. Hot tea which is collected in the cup is the filtrate and the tea leaves left on the strainer is the residue.

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Q.3 Pragya tested the solubility of four different substances at different temperatures and collected the data as given below (results are given in the following table as grams of substance dissolved in 100 grams of water to form a saturated solution).

Substances dissolved	Temperature in Kelvin				
	283K	293K	313K	333K	353K
Potassium Nitrate	21	32	62	106	167
Sodium Chloride	36	36	36	37	37
Potassium Chloride	35	35	40	46	54
Ammonium Chloride	24	37	41	55	66

(a) What mass of potassium nitrate would be needed to produce a saturated solution of potassium nitrate in 50 grams of water at 313 K?

(b) Pragya makes a saturated solution of potassium chloride in water at 353 K and leaves the solution to cool at room temperature. What would she observe as the solution cools? Explain.

(c) Find the solubility - of each salt at 293 K. Which salt has the highest solubility at this temperature?

(d) What is the effect of change in temperature on the solubility of a salt?

Ans.:

(a) Mass of KNO_3 to produce a saturated solution of KNO_3 in 100 gm of water at 313 K = 62 g

Therefore, mass of KNO_3 in 50g of water at 313 K = 62.050/100 = 31.0g

31 g of potassium nitrate is needed to produce a saturated solution of potassium nitrate at 313K.

(b) When the saturated solution of potassium chloride is left to cool at room temperature, then solid potassium chloride will separate gradually

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from the solution. Solubility of a substance depends on the temperature. Solubility increases with increase in temperature of the solution. Room temperature is lower than 313 K hence, the crystals of solute will separate out from the solution.

(c) The solubility of different salts at 293 K is: Potassium nitrate 32g ; Sodium chloride 36g; Potassium chloride 35g; and Ammonium chloride 37g. Ammonium chloride has the highest solubility of 37 g at 293 K.

(d) Solubility of a substance depends on the temperature. The given data shows that the solubility of a salt increases on increasing the temperature.

Q. 4 Explain the following giving examples:

(a) Saturated solution

(b) Pure substance

(c) Colloid

(d) suspension

Ans.: (a) In a solution the relative proportion of the solute and solvent can be varied. At a given temperature, when no more solute can be dissolved in a solution, it is called a saturated solution. The amount of the solute present in the saturated solution at this temperature is called its solubility. For example, In order to obtain a saturated solution of sodium chloride and water at 20°C, a maximum of 36 grams of sodium chloride can be dissolved in 100 grams of water.

(b) A pure substance is made up of only one kind of particles. All the constituent particles of a pure substance are the same in their chemical

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nature. These particles may be atoms or molecules. For example, sulphur is made up of only one kind of particles called sulphur atoms, therefore, sulphur is a pure substance.

(c) A colloid is a kind of solution in which the size of solute particles is intermediate between those in true solutions and suspensions. Due to the relatively smaller size of particles, as compared to that of a suspension, the mixture appears to be homogeneous. But actually, a colloidal solution is a heterogeneous mixture, for example, milk.

(d) A suspension is a heterogeneous mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of the medium. Particles of a suspension can be seen with naked eye. The particles of a suspension are able to scatter a beam of light passing through them and make its path visible. When left undisturbed, the solute particles are able to settle down. This shows that a suspension is unstable. They can be separated from the mixture by the process of filtration.

Q. 5 Classify each of the following as a homogeneous or heterogeneous mixture:

soda water, wood, air, soil, vinegar, filtered tea

Ans.: Homogenous mixture: The mixtures in which the substances are completely mixed together and are indistinguishable from each other are called homogeneous mixtures. A homogeneous mixture has a uniform composition throughout its mass. It has no visible boundaries of separation between the various constituents. A mixture of two or more miscible liquids is also a homogeneous mixture. All the homogeneous mixtures are called solutions. They consist of only one phase.

Heterogeneous mixture: A mixtures which does not have a uniform composition throughout its mass. It has visible boundaries of separation between the various constituents. The constituents of a heterogeneous

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mixture can usually be seen easily. They consist of more than one phase. A mixture of two or more immiscible liquids is also a heterogeneous mixture. For example, a mixture of petrol and water is a heterogeneous mixture.

Q.6 How would you confirm that a colourless liquid given to you is pure water?

Ans.: A pure substance is made up of only one kind of particles. All the constituent particles of a pure substance are the same in their chemical nature. These particles may be atoms or molecules. Pure substances have fixed melting or boiling point. In order to confirm that a colourless liquid is pure water, we can check its boiling point. Pure water boils at 100°C at atmospheric pressure. If this liquid also boils at 100°C then its is pure water.

Q.7 Which of the following materials fall in the category of a "pure substance"?

(a) Ice
(b) Milk
(c) Iron
(d) Hydrochloric acid
(e) Calcium oxide
(j) Mercury
(g) Brick
(h) Wood
(i) Air

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Ans.: A pure substance is made up of only one kind of particles. All the constituent particles of a pure substance are the same in their chemical nature. These particles may be atoms or molecules. All the elements and compounds are pure substances because they contain only one kind of

particles. A pure substance cannot be separated into other kinds of matter by any physical process. A pure substance has a fixed composition as well as a fixed melting point and boiling point.

Pure substances are: Ice, Iron, Hydrochloric Acid, Calcium oxide and Mercury. All these substances are pure because these are made of same kind of atoms or molecules. They have fixed melting or boiling points.

On the other hand, Brick, Air, Milk and wood are not pure substances because all of these do not have a fixed composition. Air is a mixture of gases in which the composition of gases is not fixed. Milk is a colloidal solution.

Q. 8 Identify the solutions among the following mixtures:

(a) Soil

(b) Sea-water

(c) Air

(d) Coal

(e) Soda water

Ans.: A solution is a homogenous mixture of two or more substances. So, from the given choices, sea-water, air, and soda are solutions.

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Q. 9 Which of the following will show "Tyndall effect"?

(a) Salt solution

(b) Milk

(c) Copper sulphate solution

(d) Starch solution

Ans.: Milk and Starch solution are capable of showing "Tyndall effect" because these are colloidal solutions.

A colloid is a kind of solution in which the size of solute particles is intermediate between those in true solutions and suspensions. Due to the relatively smaller size of particles, as compared to that of a suspension, the mixture appears to be homogeneous. But actually, a colloidal solution is a heterogeneous mixture, for example, milk. Because of the small size of colloidal particles, we cannot see them with naked eyes. But, these particles can easily scatter a beam of visible light known as "Tyndall effect".

Q. 10 Classify the following into elements, compounds and mixtures.
(a) Sodium
(b) Soil
(c) Sugar solution
(d) Silver
(e) Calcium carbonate
(f) Tin
(g) Silicon
(h) Coal
(i) Air
(j) Soap
(k) Methane
(l) Carbon dioxide
(m) Blood

Ans.:

Elements	**compounds**	**mixtures**
Sodium (Na)	Calcium Carbonate ($CaCO_3$)	Soil
Silver (Ag)	Methane	Sugar Solution
Tin (Pb)	Carbon dioxide (CO_2)	Coal
Silicon (Si)		Air
		Soap
		Blood

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Q.11 Which of the following are chemical changes?

(a) Growth of a plant
(b) Rusting of iron
(c) Mixing of iron filings and sand
(d) Cooking of food
(e) Digestion of food
(j) Freezing of water
(g) Burning of a candle

Ans.: Growth of a plant, Rusting of iron, Cooking of food, Digestion of food and Burning of a candle are chemical changes.

Chemical change brings change in the chemical properties of matter and a new substances is formed. A chemical change is also called a chemical reaction. All of the above changes have resulted in the formation of new substances as a result of chemical reactions.

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Class 9th Science (Chemistry)

02

IS MATTER AROUND US PURE

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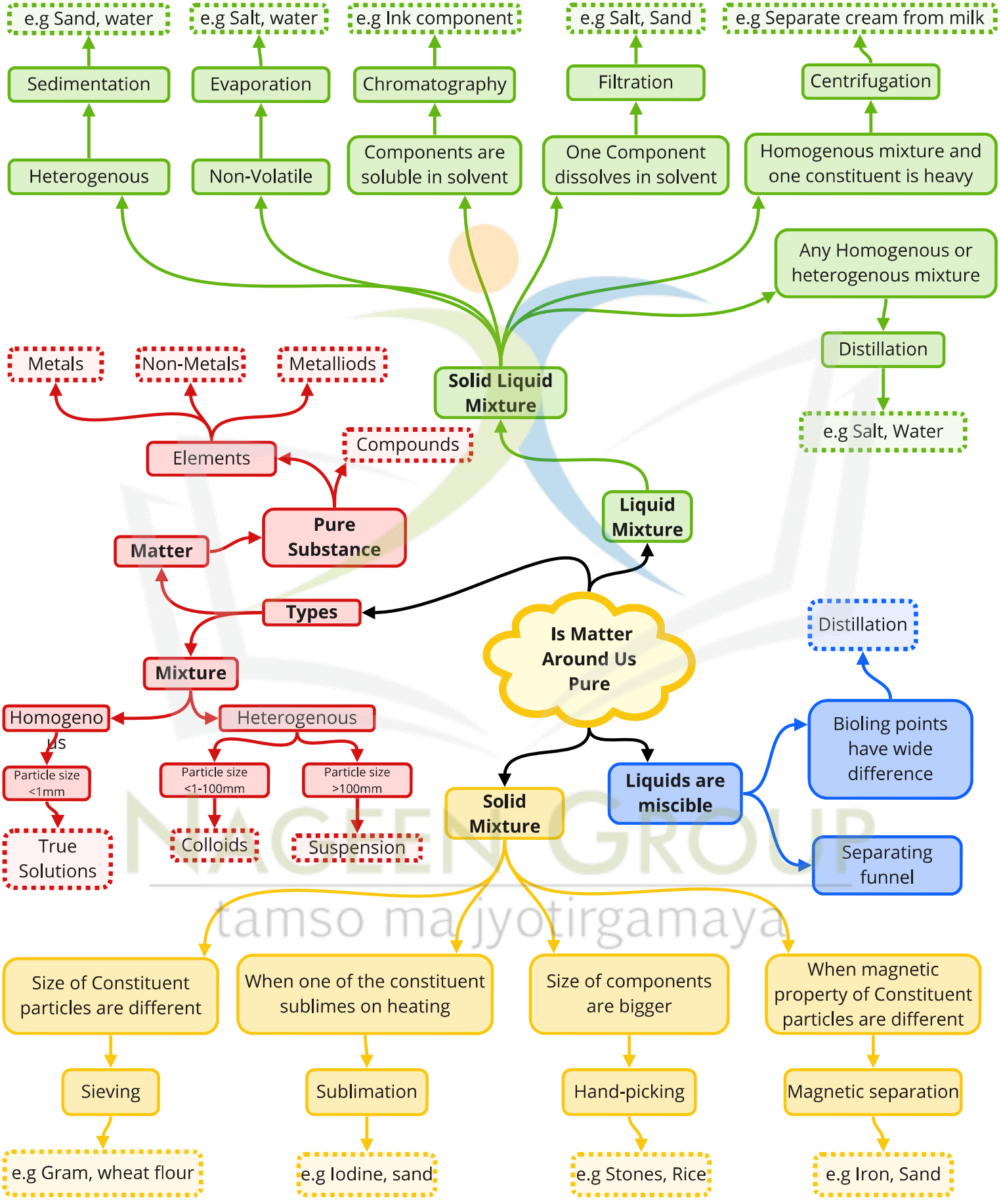

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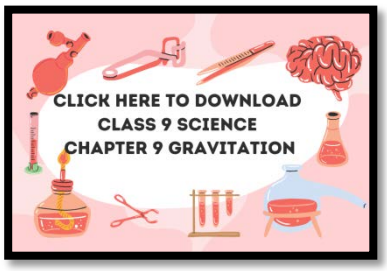

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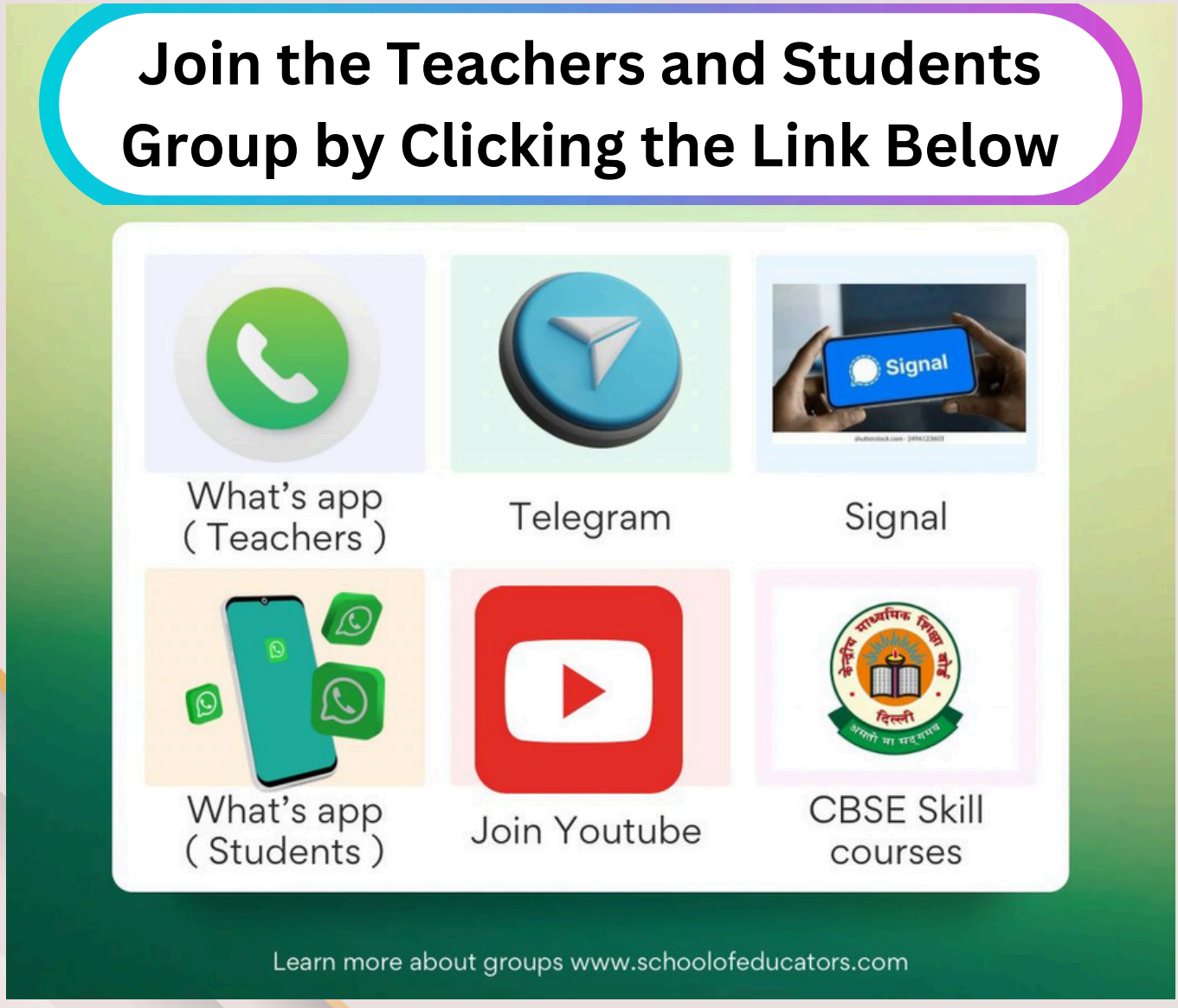
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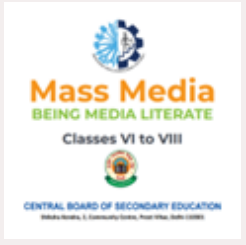

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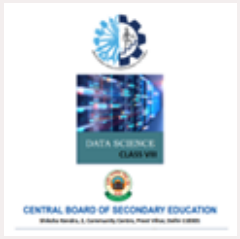

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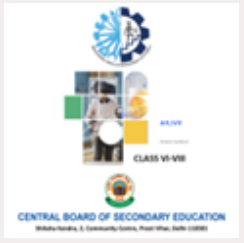

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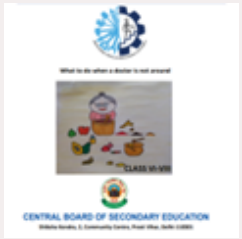

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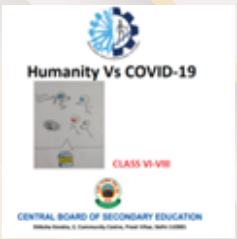

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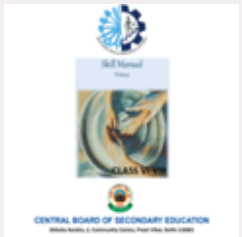

Pottery

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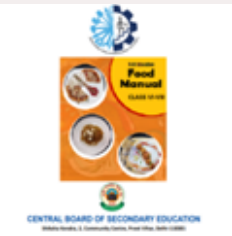

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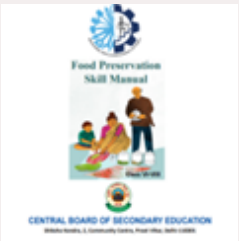

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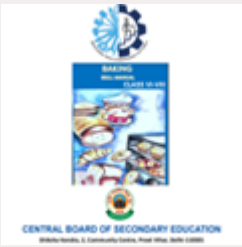

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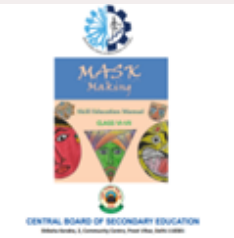

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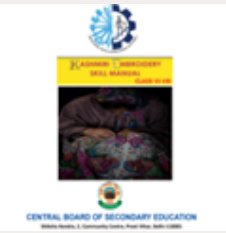

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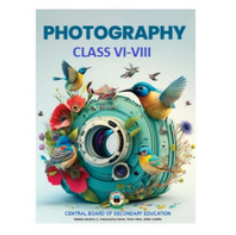
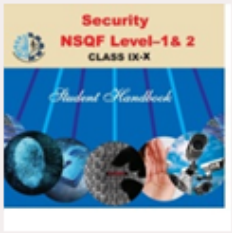


Photography

SKILL SUBJECTS AT SECONDARY LEVEL (CLASSES IX – X)

Retail

Information Technology



Security

Automotive

Introduction To Financial Markets

Introduction To Tourism

Beauty & Wellness

Agriculture

Food Production

Front Office Operations

Banking & Insurance

Marketing & Sales

Health Care

Apparel

Multi Media

Multi Skill Foundation Course

Artificial Intelligence

Physical Activity Trainer

Data Science

Electronics & Hardware (NEW)

Foundation Skills For Sciences (Pharmaceutical & Biotechnology)(NEW)

Design Thinking & Innovation (NEW)

SKILL SUBJECTS AT SR. SEC. LEVEL (CLASSES XI – XII)

Retail

InformationTechnology

Web Application

Automotive

Financial Markets Management

Tourism

Beauty & Wellness

Agriculture

Food Production

Front Office Operations

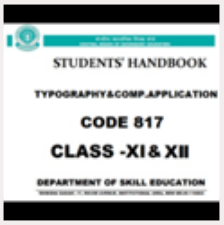
Banking

Marketing

Health Care

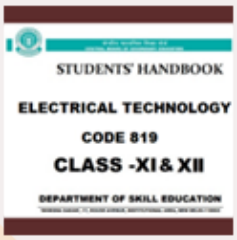
Insurance

Horticulture



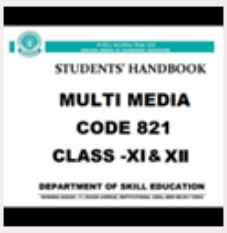
Typography & Comp. Application

Geospatial Technology



Electrical Technology

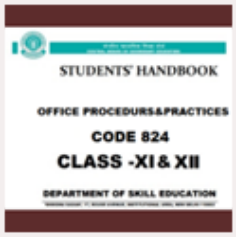
Electronic Technology



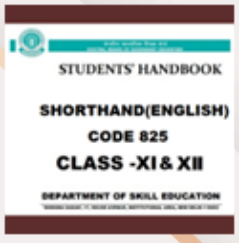
Multi-Media

Taxation

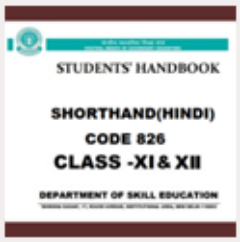
Cost Accounting



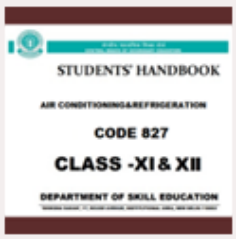
Office Procedures & Practices



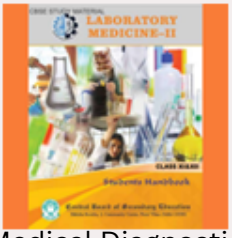
Shorthand (English)



Shorthand (Hindi)



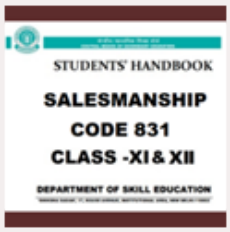
Air-Conditioning & Refrigeration



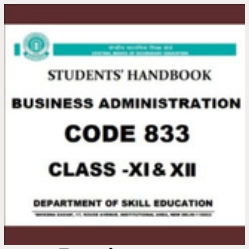
Medical Diagnostics

Textile Design

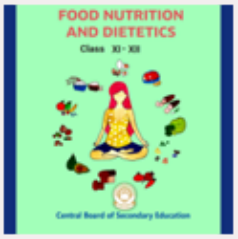
Design



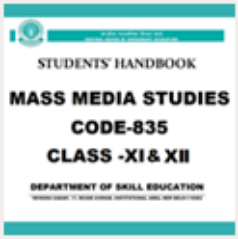
Salesmanship



Business Administration



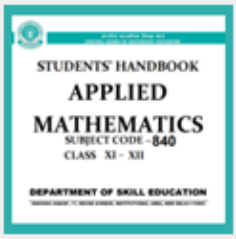
Food Nutrition & Dietetics



Mass Media Studies

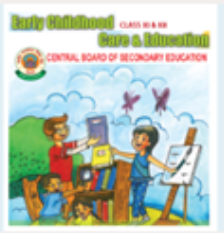
Library & Information Science

Fashion Studies



Applied Mathematics

Yoga

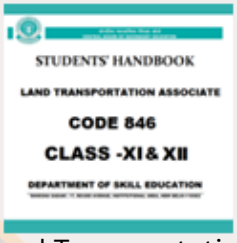


Early Childhood Care & Education

Artificial Intelligence

Data Science

Physical Activity Trainer(new)



Land Transportation Associate (NEW)

Installation Technician Computing and Peripherals
Sector: Electronics and Hardware
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Design Thinking & Innovation (NEW)

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Science

English

Hindi-A

Hindi-B

IT Code-402

IT

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Chemistry

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Mathematics

Biology

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BST

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Class 8

Join us on Telegram

Class 9

Join us on Telegram

Class 10

Join us on Telegram

Class 11 (Sci)

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Class 12 (Hum)

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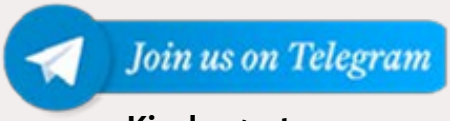
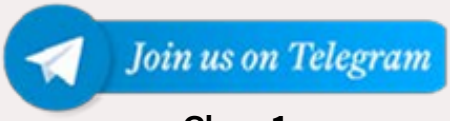
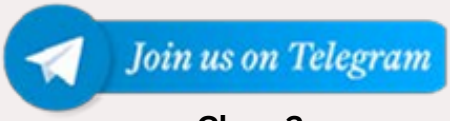


Kindergarten



Class 1



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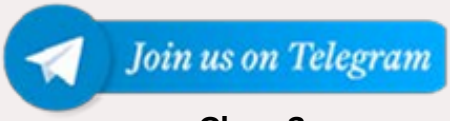

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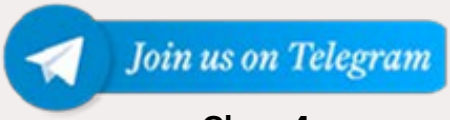

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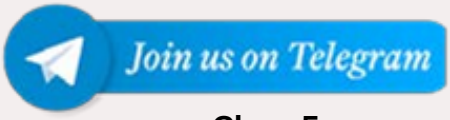
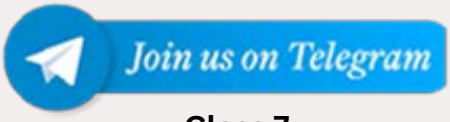


Class 5

Class 6



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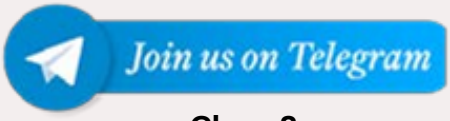

Class 8

Class 9

Class 10

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Class 11 (Hum)

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